MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for May, 1905, is based on data from about 3583 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 176; West Indian Service, cable and mail, 4; River and Flood Service, regular 52, special river and rainfall, 363, special rainfall only, 98; cooperative observers, domestic and foreign, 2565; total Weather Bureau Service, 3258; Canadian Meteorological Service, by telegraph and mail, 33; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 1; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25. Total, 3583.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S.I. Kimball, General Superintendent of the United States Life-Saving Service; Commander H. M. Hodges, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; and Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that at regular Weather Bureau stations all data intended for the Central Office at Washington are recorded on seventy-fifth meridian or eastern standard time, except that hourly records of wind velocity and direction, temperature, and sunshine are entered on the respective local standards of time. As far as practicable, only the seventy-fifth meridian standard of time, which is exactly five hours behind Greenwich time, is used in the text of the REVIEW. The standards used by the public in the United States and Canada and by the cooperative observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^h\ 36^m$ west of Greenwich.

Barometric pressures, whether "station pressures" or "sea-level pressures", are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

Since December, 1904, the Weather Bureau has received an average of about 1700 reports from as many observers and vessels, giving international simultaneous observations over the Atlantic and Pacific oceans at 12 noon, Greenwich time, or 7 a. m., seventy-fifth meridian time. These are charted, and, with the corresponding land observations, will form the framework for daily weather charts of the globe.

In conformity with Instructions No. 43, March 29, 1905, the designation "voluntary", as applied to the class of observers performing services under the direction of the Weather Bureau without a stated compensation in money, is discontinued, and the designation "cooperative" will be used instead in all official publications and correspondence.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The disturbances that advanced from the American Continent over the western Atlantic were of slight intensity. In the vicinity of the Azores barometric pressure was high, except from the 15th to 20th, when that region was occupied by a depression that appeared to pass thence over Portugal and Spain. The advance of depressions over the eastern Atlantic was attended by low pressure over the British Isles on the 1st to 3d, 10th, 11th, and 18th to 20th, and pressure fluctuated in that region from the 27th to 31st. From the 4th to 9th, and 12th to 17th the barometric pressure was high over and near the British coasts.

In the United States the more important barometric disturbances advanced from the middle Plateau and middle Rocky Mountain regions over the central valleys and the Great Lakes. The effect of the development and presence, during a great part of the month, of depressions in the western mountain and Plateau districts was an alternation of periods of precipitation and low temperature over the western half of the country. In the Plateau and western mountain districts the precipitation was partly in the form of snow. During the early part of the month frost and freezing temperatures occurred as far south as northern New Mexico and northern Arizona. The western depressions lost intensity in crossing the central valleys and the center of but one low area, No XII, advanced over the Southern States east of the Mississippi.

In several instances the eastward advance of low areas was attended by tornadic storms in the Middle West and Southwest. One of the most important of these storms occurred on the night of the 8th at Marquette, Kans., and the most destructive tornado of the month visited Snyder, Okla., the evening of the 10th. In each instance the tornado occurred in the eastern quadrant of a barometric depression that advanced over Colorado and Kansas.

In the early part of the month, bottom lands along the Brazos River between Hearne and Richmond, Tex., were flooded, the damage being lessened by timely warnings. At the close of the 2d and in the early part of the 3d decade water stages were high in the rivers and streams of the middle and lower Ohio Valley, and during the latter part of the month flood stages were reached in the Arkansas and Red rivers in western Arkansas and northwestern Louisiana, and in the Rio Grande in New Mexico. The high stages of rivers and streams and the warnings issued in connection therewith are discussed under the heading "Rivers and Floods."

The following from the Rocky Mountain News, Denver, Colo., of May 30, 1905, shows results accomplished in the

newly organized Rio Grande Valley extension of the Weather Bureau River and Flood Service:

The Weather Bureau's scope of usefulness has been largely increased by the preparation and issuance of bulletins on the rise of the various rivers in Colorado and New Mexico, and hereafter the farmers will have no excuse for losses of crops by floods of which they had not been warned.

The new system was inaugurated on May 1, and bulletins were furnished to points along the Rio Grande River. Every rise was foretold from two to five days ahead, and the height was given within a tenth of a foot. The residents of Albuquerque, Rincon, Las Cruces, and other points were warned of the floods, which occurred Saturday and Sunday, as early as last Thursday.

On Thursday of last week a bulletin was telegraphed to El Paso that the Rio Grande River would reach its highest point of the season yesterday and that it would reach a height of 13.7 feet. Yesterday afternoon Forecaster Brandenburg received a telegram from El Paso stating that the river had reached the height of exactly 13.7 feet.

At the same time Rincon, Las Cruces, Engle, Socorro, and Albuquerque were warned that the river would reach the same height as that reached in the memorable flood of last October. The warning was heeded to a certain extent, and where it was the damage was minimized.

The success of the system has resulted in ordering a similar service for the Arkansas River east of Pueblo, including the Purgatoire, or the Picket Wire, as it is called, from Trinidad to Las Animas. The service will also be installed on the Pecos River in eastern New Mexico and western Texas, and on the Canadian River.

BOSTON FORECAST DISTRICT.

The month, as a whole, was dry, cold, and unpleasant for the season of the year. Snow fell in many sections on the 1st, with amounts ranging from a trace to several inches. Frosts occurred throughout the section, particularly on the 24th, and in parts of the Northern States the ground froze and ice formed on still, shallow water. In sections where the cold was severe, vegetation was not sufficiently advanced to suffer much damage. The small amount of precipitation was the most conspicuous feature of the month. The average for the month for the entire district, 1.82 inches, is the smallest for May in the history of the New England Weather Service, except 1.79 inches in 1899, and 0.68 of an inch in 1903, and it is a little more than 50 per cent of the normal for the month. The month was devoid of severe storms or high winds and gales. There was, however, more than the usual amount of fog, of which there was considerable complaint. No storm warnings were issued during the month and there was no delay to shipping by reason of high winds.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

No general storm appeared in the district during the month and no special warnings were issued. Severe local storms occurred on several dates and forecasts for thunderstorms had been issued in nearly every instance. The latter part of the month was unusually wet over a great part of the district.—*I. M. Cline, District Forecaster.*

CHICAGO FORECAST DISTRICT.

The upper Lakes were comparatively free from storms. Storm warnings were ordered on only a few dates during the first half of the month, and, as a rule, only the lighter craft were inconvenienced, and no wrecks occurred as far as known. Frost warnings were issued on several dates and the cranberry growers of Wisconsin were carefully advised previous to the occurrence of each frost.—*H. J. Cox, Professor and District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

There were no severe or damaging storms in the district, although a number of thunderstorms occurred, attended by heavy rainfall, and some by hail. Light frost occurred in the extreme northern portion of the district on the morning of the 1st, and a cool spell prevailed from the 15th to 20th.—*Ferdinand J. Walz, District Forecaster.*

DENVER FORECAST DISTRICT.

The month was cold throughout the district, with an excess of precipitation in the northern part and a marked deficiency on the southern slope. Vegetation remains backward, owing to the frequent frosts, nearly all of which were forecast. The cooler weather retarded the melting of snow in the high mountains of Colorado, but on the southern slope, where high temperatures prevailed, there was a rapid melting of snow even at the highest altitudes. Streams were badly swollen from the beginning of the month; destructive floods, warnings of which were timely, occurred in the lower Rio Grande during the latter half; during the closing days of the month points below San Marcial were advised that the water would reach or come within one foot of the flood of last fall. At El Paso active preparations were made for the flood and all possible steps were taken to minimize damage.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

Unsettled weather prevailed throughout the month. Heavy rainfalls occurred and over the southern half of the Sierra Nevada Mountains the snowfall was heavy.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

No severe general storm passed over the district. Local storms, accompanied by heavy rainfalls, occurred frequently in the mountain districts, and some loss of life and considerable damage to farm property was caused in some localities by sudden floods sweeping down the steep canyons. Frost warnings were issued to points east of the Cascade Mountains when conditions demanded them, and as a rule the warnings were successful.—*A. B. Wollaber, Acting District Forecaster.*

RIVERS AND FLOODS.

The moderate floods in the Texas rivers continued during the first few days of the month, and additional warnings were issued May 1. The heavy rains of the 13th and 14th started another decided rise, and warnings of dangerous rises in the Brazos and Trinity rivers were issued on the 14th and 15th. The stages reached were from two to nine feet above the danger lines, but it is thought that no serious losses occurred, except such as were absolutely unavoidable. The rivers continued comparatively high over their lower reaches until the end of the month.

The Red River was high throughout the month as a result of the numerous heavy rains, and warnings were first issued on the 13th. The danger line of 28 feet was passed at Fulton, Ark., on the 16th, and by the end of the month the entire river from Fulton southward was from 2.5 to 3.5 feet above the danger line. A full report of this flood will appear in the REVIEW for June, 1905.

The lower Arkansas, White, Ouachita, and Atchafalaya rivers were also in moderate flood, and stages several feet above the danger lines were quite general, except in the Arkansas River. The usual warnings were issued for these floods.

There were heavy rains and snows over the mountainous upper watershed of the Rio Grande beginning about the 15th, and on the 18th it became necessary to issue another flood warning to points between Albuquerque, N. Mex., and El Paso, Tex. Supplementary warnings were issued almost daily thereafter, and the high water still continued at the close of the month. A report of this flood will appear in the REVIEW for June, 1905.

There were also some moderately high waters in the lower Ohio and tributaries as a result of the heavy rains on the 12th, but danger-line stages were not quite reached except in the Ohio at Evansville, Ind., and in the Wabash and Duck rivers. Warnings were issued whenever necessary between the Great Kanawha River and Cairo, Ill. About 10,000 acres of farm land were overflowed from the mouth of Green River to Henderson, Ky.; about 7000 acres on the Indiana, and 3000 acres on the Kentucky side. Most of this land was planted in

corn and but little can be replanted. The amount of damage can not be given with any degree of accuracy, but it is apparent that the flood destroyed the excellent prospects that had previously been entertained of harvesting the largest corn crop of the last twenty years. Below Mount Vernon, Ind., stock was removed from the bottoms, and portable property protected, so that there was no loss except the labor of replanting corn lands that had been overflowed.

The Mississippi and Missouri rivers were higher than during the preceding month, but there were no floods.

The highest and lowest water, mean stage, and monthly range at 278 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Divison.

The following summaries relating to the general weather and crop conditions during May are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon reports from cooperative observers and crop correspondents, of whom there are about 3300 and 14,000, respectively:

Alabama.—Weather favorable for growth, though rainfall generally excessive, retarding work. Cotton made satisfactory stands and fairly good growth, though grass increased so rapidly that some fields were abandoned, labor scarce, some damage by lice; squares appeared on early planted during last week. Corn and minor crops advanced well; some corn damaged by worms and overflow; forward corn silking at close of month. Early peaches were ripening at end of month, and oat and wheat harvest active, wheat indicating light yield, oats satisfactory.—*F. P. Chaffee.*

Arizona.—Temperature greatly deficient. There was a generous supply of precipitation over the northern division, while over the southern and western divisions the shortage was extremely large. Phenomenally heavy snowfall 2d to 6th. Wheat, barley, and oat harvest general and garden truck, apricots, and figs plentiful throughout the central and southern divisions; yields large, quality excellent. Rapid progress in farm work in north division. Corn planting finished, stands good. Large shipments of berries, melons, and apricots. Mountains and streams contained an overabundance of water. Stock healthy. Second alfalfa cutting on the 25th.—*L. N. Jesunofsky.*

Arkansas.—The temperature was moderate and the rainfall unusually heavy. Owing to unfavorable weather cotton and corn planting was not completed during the month. Cotton came up to a fair stand, but made slow progress owing to lack of cultivation and to too much moisture. Chopping became fairly general by the close of the month. Corn was a fair stand, but was small and had poor color. Minor crops and fruits did well, although there was considerable complaint of apples dropping.—*Edward B. Richards.*

California.—Abnormally cool and generally cloudy weather during the greater part of the month retarded crop growth. Severe frosts caused some damage to deciduous fruits in the foothill districts, and in some sections new hay and early fruits were injured by heavy rain and hail. The rainfall was greatly in excess of the average in the Sacramento and San Joaquin valleys, and the temperature for the State was 3.6° below the normal. High winds and thunderstorms were of frequent occurrence.—*Alexander G. McAdie.*

Colorado.—Except in the southwestern counties during the last decade, conditions were generally unfavorable. Considerable damage by hailstorms occurred in localities on the eastern slope. At the close of the month seeding and planting were nearly finished, except in localities east of the mountains, where some sugar beets, potatoes, and corn remained to be planted, but early plantings were up; wheat, oats, rye, alfalfa, and grasses were doing well, and fruit prospects good.—*F. H. Brandenburg.*

Florida.—The month averaged warmer and wetter than the normal. Work advanced very well, except during a few days when it was retarded by too frequent rain. The bulk of the cotton crop was chopped out and and the early planting took on some fruit. Some replanting was done on lowlands. The corn crop promised to be an excellent one. Citrus trees were vigorous. Cane, tobacco, and minor crops did well. Shipments of peaches, pineapples, and melons began.—*A. J. Mitchell.*

Georgia.—Month warm; too wet for farm work. Cotton planting completed by 15th; stand excellent; fields became very grassy, some abandoned; plants were generally healthy and made good growth where worked; some injury by lice; labor scarce. Corn progressed nicely; received insufficient cultivation; some injured by bud worms; laying by began south; late planting unfinished. Wheat yield shortened by rust. Oats generally fine. Early peaches began to ripen south, good yield, excellent quality; crop poor north.—*J. B. Marbury.*

Hawaii.—See Addendum et Corrigenda, on a subsequent page.

Idaho.—Cool weather retarded the growth of vegetation and some damage to fruit and tender vegetables resulted from frost, but at the close of the month most crops were in good condition. Ranges were unusually good and stock made excellent gains. An unusually heavy shower occurred in the mountains back of the city of Boise on the evening of the 27th, flooding a portion of the city for several hours; only slight damage resulted.—*Edward L. Wells.*

Illinois.—By the 15th corn was mostly planted in the central district. Wheat and rye were heading out. Clover was in bloom in the southern district. At the end of the month the bulk of the corn crop was in the ground in the region of heaviest production. Wheat, oats, rye, grasses, and potatoes were promising. Tree fruit, except peaches, gave promise of a fair yield, although much complaint was made of fruit falling.—*Wm. G. Burns.*

Indiana.—Owing to excess of moisture in the ground sowing oats was not finished until about the middle of the month and much corn ground had not been seeded at its close. Oats came up to a good stand and early corn did fairly well. Wheat, rye, clover, and timothy continued promising. Transplanting tomatoes and tobacco progressed satisfactorily the latter part of month. Field onions suffered from flooding. Apples, peaches, pears, and plums promised fair crops, cherries light; grapes and other small fruit good.—*W. T. Blythe.*

Iowa.—Month cooler than usual, with excessive rainfall in northern half of State; planting operations delayed and germination of corn retarded, conditions necessitating more than usual replanting. At close of month corn had made better stand than was previously anticipated and fields were being cultivated. Month was favorable for growth of wheat, oats, barley, rye, potatoes, and garden truck. Apples were generally promising, but cherries and plums were light; grapes and berry crop very good.—*John R. Sage.*

Kansas.—Wheat was heading in the southern counties the first week and in the northern the last week of the month. Corn planting was nearly finished the first week, much of it was up, and cultivation had begun. Oats improved slowly, began heading in the southern counties the third week and in the northern the last week. Grass improved. Alfalfa cutting began in southern counties first week, in northern by 15th, was damaged by frequent showers. Apples poor prospects in some counties, very promising in others.—*T. B. Jennings.*

Kentucky.—Temperature averaged slightly above normal, except in the south-central portion. Frost in the extreme northern counties on the 1st did no damage. Month generally favorable, but heavy rains caused damage in some localities. Wheat made excellent progress and condition was satisfactory in most sections. Oats, rye, and grasses were generally excellent. Potatoes grew nicely; tobacco was mostly set and looked vigorous. Corn planted, except where flooded, and mostly cultivated. Fruit dropping somewhat, but promised fair crop.—*F. J. Walz.*

Louisiana.—Favorable weather prevailed generally during early part of month, but frequent showers and occasionally heavy rains during latter half materially interfered with farming operations. The cotton crop was generally two to four weeks late, and planting continued in some sections; the bulk of the crop was badly in the grass at close of month and some lowland had been abandoned. The cane crop made good growth. Rice seeding progressed slowly and the crop was very backward. Corn suffered from too much rain, which prevented proper cultivation. Early corn was being laid by at close of month. Truck gardens yielded well.—*I. M. Cline.*

Maryland and Delaware.—Warm and droughty first half; good rains middle of month, followed by cool weather. Wheat made good heads. Oats had good stand and color, but were very backward. Corn was retarded by cool and dry weather and seriously devastated by cutworms. Grasses were short. Apples and cherries about average; pears below average; peaches light. Strawberries of fine quality were abundant. Other small fruits budded profusely. Little tobacco was set out, but plants were plentiful and thrifty. Gardens grew slowly.—*E. D. Emigh.*

Michigan.—The cool, wet weather of May, while generally favorable to wheat, rye, and meadows, interfered with planting and growth of corn, potatoes, and early beans, and retarded the growth of oats and barley. Continued wet weather blasted some fruit blossoms, especially cherries. Germination was slow, but fairly good. At close of month corn and sugar beet seeding was fairly well advanced, and early potatoes mostly planted. Wheat, rye, and meadows were in very promising condition at the end of the month.—*C. F. Schneider.*

Minnesota.—Wet weather until the 18th, and showery thereafter. Lowlands flooded and farm work hindered. Light frost 25th and 26th.

Flax and barley seeding all the month. Corn and potato planting nearing completion by end of month, and early corn, potatoes, and flax coming up by 20th. Spring wheat, oats, and barley doing well all month, and stooling nicely, but all growth was slow much of month. Rye heading by 20th. Clover and timothy promised well.—*T. S. Outram.*

Mississippi.—Planting was much hindered by frequent and heavy rains north, especially on lowlands, but generally made fair progress south. Good stands of cotton were secured and by the close of the month chopping was well advanced and cultivation was in progress, but many fields remained very grassy. Labor was scarce. Early corn was generally in fair condition; much corn remained to be planted on lowlands. Oats were promising and harvest began south. Sugar cane, potatoes, gardens, and pastures did well. The fruit outlook was poor to fair.—*W. S. Belden.*

Missouri.—The month of May was generally favorable for crop growth and cultivation. Corn planting was practically completed at the close of the month; considerable replanting was necessary, owing to poor germination; growth was satisfactory, although not vigorous, the nights being rather too cool for best results. Wheat was heading and blooming and promised an average yield. Oats, potatoes, and all minor crops were satisfactory.—*George Reeder.*

Montana.—Only about eight days with temperature above normal. Precipitation not up to normal, but State average greater than any of eighteen preceding months. Wheat and oats a good stand and made about a normal growth. Range grass was plentiful during the latter part of the month and cattle and sheep gained rapidly. Lambing operations were very successful. Alfalfa, potatoes, and fruits made slow progress, but promised well, and no material damage resulted from frost.—*R. F. Young.*

Nebraska.—Winter wheat made excellent growth and continued in good condition, except in a few places where the Hessian fly damaged the crop slightly. Oats made only a fair growth. Potatoes, alfalfa, and grass made especially good growth. Corn planting progressed slowly until the middle of the month, but was about finished by the 25th. Early planted corn came up poorly; this, and damage from heavy rain, made an unusual amount of replanting necessary.—*G. A. Loveland.*

Nevada.—The month was cooler than the average May, with precipitation slightly above normal. Frosts occurred frequently, doing considerable damage to fruit buds and early vegetables. Weather conditions were generally unfavorable for rapid growth of crops. Range feed was the best in years and stock of all kinds gained rapidly in flesh. Irrigation water for crop needs was generally plentiful in most districts.—*J. H. Smith.*

New England.—The month as a whole was cool and dry, with temperature and precipitation below normal at nearly all stations. Frosts were of general occurrence on the 24th, and snow fell in many northern sections on the 1st, amounting in a few instances to two inches. The unfavorable weather conditions retarded crops and in many fields planted seeds failed to germinate. Excepting the hay crop, which will be short, the drought caused little damage beyond delaying growth.—*J. W. Smith.*

New Jersey.—The month was very dry and the rainfall that occurred was quite unevenly distributed. The last killing frost occurred on the 2d, doing considerable injury to tender vegetation, but very little to orchard fruit trees. Wheat and rye headed well, but the straw was very short; grass and clover crops suffered greatly from drought.—*Edward W. McGann.*

New Mexico.—Dry, cool month, but soil conditions good. Moisture generally abundant. Streams high and some damage by floods, especially in middle and lower Rio Grande Valley. Field crops, gardens, fruits, forage crops, range grasses, and late seeding and planting made good progress. First cutting of alfalfa continued throughout the month, with heavy yield. Stock losses confined to northeast counties during first decade, thereafter steady and rapid improvement. Very large percentage of increase in lambs, but light in calves. Shearing rapidly completed.—*Charles E. Linney.*

New York.—Weather favorable for farm work. Small grains and grass did fairly well, but nights too cool for other crops. More rain needed in some localities. Light frosts were frequent. Killing frosts reported in some localities 21st to 24th, damage not extensive. Apples bloomed well, with the exception of Baldwins. Corn and potatoes were planted and early fields were coming up during the latter part of the month. Gardens were made, but growth of all vegetables was slow.—*H. B. Hersey.*

North Carolina.—The temperature was above normal during May, except during the period from the 18th to 27th, when low temperatures at night severely checked the growth of vegetation. The rainfall was very excessive, and there were many severe local wind and hail storms, with minor damage to crops. Planting was much delayed and crops could not be properly cultivated. Much corn and cotton were planted and came up to good stands, but stands of corn were impaired by ravages of cutworms. The bulk of the tobacco crop was transplanted and did well. Wheat, rye, winter and spring oats, clover, and grasses made vigorous growth. Fruit suffered from blight.—*C. F. von Herrmann.*

North Dakota.—The month was cooler than the average, with excessive precipitation, heavy rain over a greater portion of the State causing more or less injury to crops, especially on low land. Killing frosts also cut down some early sown grain and injured fruit buds, and high winds cut down tender vegetation and blew out and uncovered seed. With ample moisture and warmer weather at the close of the month, all vegetation greatly improved.—*F. J. Rupert.*

Ohio.—Excessive rains during first week caused considerable damage by washing and flooding, and frost on 24th did some damage in northeast; otherwise, generally favorable weather prevailed. Corn planting and tobacco setting progressed rapidly. Corn was small and uneven and of poor color. Wheat, oats, rye, meadows, clover, pastures, and early potatoes improving. Wheat heading. Apples, pears, and plums less promising. Berries improving.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Tornadoes, hailstorms, and excessive precipitation in localities caused great loss of life and destruction to property. Wheat, oats, rye, spelt, and barley headed well and were in fair to good condition. Corn was weedy and needed cultivation, but did well. Cotton up to poor to good stands and being chopped, some damage by worms, rotting, and overflow. Minor crops, potatoes, gardens, grass, stock, and fruit did well.—*C. M. Strong.*

Oregon.—The month was cool and cloudy; there was plenty of rain at opportune times, but the lack of warm, sunshiny weather retarded growth. Frosts considerably damaged early fruit and tender vegetables. Barley, rye, and fall wheat headed nicely. Spring wheat and oats grew slowly. Hops came up very unevenly. Grass grew luxuriantly and there was plenty of feed for stock. Gardens, potatoes, corn, sugar beets, field onions, and beans made slow growth.—*A. B. Wollaber.*

Pennsylvania.—Damaging frosts in nearly all sections 21st to 24th, inclusive; tender vegetation and orchard and vine fruits materially injured in many localities. Droughty conditions retarded germination of late planted corn and potatoes. Wheat and rye were heading short, but stand was generally good. Tobacco thrifty and of good color. Early corn under cultivation, with cutworms becoming numerous and doing severe damage. Buckwheat land being prepared. All crops, especially meadows and pastures, badly in need of ample moisture.—*T. F. Townsend.*

Porto Rico.—Dry weather prevailed throughout the southern division; elsewhere the rainfall was equal to or in excess of requirements. Cane cutting continued, with but little interruption; crop nearly finished, yield generally good. Young canes looked promising. Coffee blossomed a second and third time in the highlands; prospects for coming crop good. Cane, rice, and small crops planted. Cotton and tobacco harvested. Pastures needed a good soaking rain in the south. Pineapples and mangoes plentiful and some alligator pears marketed. Small crops generally abundant, although some loss of beans and corn in the southwest.—*E. C. Thompson.*

South Carolina.—The temperature was at times too low for the satisfactory development of cotton, but was generally favorable. The precipitation was excessive over the larger portion, the rains having been too frequent, hindering the preparation, planting, and cultivation of lands, thus permitting fields to become foul. Where proper cultivation was practicable, corn and cotton developed favorably. Wheat and oats began to ripen, and some were cut. Fruits, rice, and gardens improved, but tobacco was hurt by excessive precipitation.—*J. W. Bauer.*

South Dakota.—Cool month, excess in precipitation benefited small grains and grasses, but retarded field work and made some lowlands too wet. Wheat, oats, barley, rye, and spelt did well, but some scattered fields of wheat and oats were thin. Corn planting was nearly finished, but germination was slow, and poor seed necessitated some replanting. Flax sowing and potato planting advanced favorably. Grass did well, affording good pasturage by the 20th. Storms early in month caused considerable loss of range stock. Frost injured some fruit.—*S. W. Glenn.*

Tennessee.—May was generally favorable for farm work, which progressed well, except when hindered by the rains, which fell at frequent intervals. Corn and cotton made fair growth; the cool nights were detrimental to cotton. Tobacco setting progressed well to completion under the favorable conditions. The rains caused rust to develop to a serious extent in wheat and greatly lessened the prospective yield. Oats promised a fine yield. Potatoes and other minor crops and garden products made good progress in growth and development. Fruit prospects continued poor.—*H. C. Bate.*

Texas.—May was generally warm. Showers occurred over northern and central portions during most of the month, causing damage by flooding and washing crops and delaying farm work. In the south there was less rainfall, and crops generally did well. Cotton planting and cultivation were delayed in central and northern counties, and the crop was not promising at the end of the month. In the south the crop did well, but the boll weevil made its appearance. Corn and grain suffered. Other crops did fairly well.—*M. E. Blystone.*

Utah.—Temperatures were about 5° daily below the normal, and precipitation was considerably above. Freezing temperatures, which were frequent around the 10th, were not generally injurious. Alfalfa was maturing a fair first crop, and was being harvested in the southern portion. Corn, potatoes, and beets were planted and were coming up in early fields. Fall grain was heading and all grain was doing well. The fruit outlook was good, though the peach crop was dwarfed by early frost. The range was good and stock thriving.—*R. J. Hyatt.*

Virginia.—The temperatures were variable, but on the whole were well suited to crop progress, while precipation was ample and well dis-

SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, MAY, 1905.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	74.2	+ 2.7	Thomasville	99	29	Riverton Scottsboro	44 44	1 18	5.51	+2.10	Montgomery	9.10	Tuskegee	1.67
Arizona	65.5	− 5.0	4 stations	110	3 dates	Flagstaff (a), Williams.	20	11	0.20	−0.13	Flagstaff (b)	1.88	22 stations	0.00
Arkansas	70.7	+ 1.1	Jonesboro Osceola	98 98	31 29	Pond	40	17	9.57	+4.64	Howe	23.50	Fort Smith	4.92
California	59.6	− 3.6	Volcano Springs	111	15	Bodie	5	10	2.18	+1.02	Bowman's Dam	7.25	7 stations	0.00
Colorado	49.9	− 2.7	Delta Las Animas	90 90	31 29	Silverton Antelope Springs	0 0	11 11	2.15	+0.12	Fort Collins	5.35	Saguache	0.10
Florida	78.7	+ 3.0	Marianna	101	12	Brooksville	48	2	5.56	+1.75	Wausau	13.49	Key West	0.54
Georgia	74.5	+ 2.7	Blakely	101	29	Clayton	39	20	5.02	+1.80	Dahlonega	9.54	Millen	1.93
Hawaii	72.2†	....	Wailuku, Maui	93	25	Olaa Mill, Hawaii	49	4 dates	5.87‡	....	Honomanu Val. Maui	27.60	Kihei, Maui	0.00
Idaho	51.1	....	Garnet Orofino	94 94	16 31	Soldier	11	22	2.38	....	Grangeville	5.21	Blackfoot	0.30
Illinois	63.2	+ 0.1	St. John	94	29	Lanark St. Charles	33 33	7 1	4.42	+0.36	Martinton	8.93	Benton	0.84
Indiana	63.5	+ 1.1	Bedford Mount Vernon	95 95	3 29	Auburn	28	1	5.96	+2.05	Butlerville	10.02	Hector	3.25
Iowa	58.3	− 2.1	Glenwood Wilton	88 88	3 29	Washta	28	26	5.95	+1.82	Hanlontown	10.83	Bonaparte	2.57
Kansas	63.1	− 1.1	Cunningham	95	1	Colby	29	17	4.54	+0.45	Columbus	8.98	Hugoton	1.37
Kentucky	68.0	+ 2.0	Jackson Owenton Shelbyville	95 95 95	29 28 5	West Liberty	38	1	5.23	+1.05	Scott	8.17	Loretto	2.09
Louisiana	77.4	+ 3.4	Alexandria Minden	99 99	31 28	Ruston	48	1	5.48	+2.51	Amite	9.68	Port Eads	0.65
Maryland and Delaware	64.7	+ 1.6	Boettcherville, Md.	97	4	Deer Park, Md Oakland, Md	25 25	21 8	2.90	−0.61	Solomons, Md	6.12	Bachman's Valley, Md.	0.70
Michigan	53.2	− 1.0	South Haven	92	4	Mancelona	14	1	4.53	+1.50	Deer Park	10.50	Mancelona	0.93
Minnesota	52.6	− 3.5	4 stations	83	4, 31	Pine River Dam	11	10	5.53	+2.13	Rolling Green	8.31	Hovland	2.44
Mississippi	74.9	+ 2.4	Lake Como Laurel Shoccoe	98 98 98	30 27, 30 29	Lake Okolona	41 41	1 2	5.27	+1.67	Ripley	10.50	Vicksburg	2.95
Missouri	64.9	+ 0.1	Zeitonia	94	10	Oregon	34	5	4.87	+0.03	Dean	12.03	Marshall	1.74
Montana	48.8	− 3.8	Troy	89	31	Red Lodge	8	11	2.24	−0.22	Absarokee	8.42	Alzada	0.40
Nebraska	56.2	− 3.4	Bartley	92	1	Agate	23	5, 6, 17	5.73	+2.04	Genoa	11.35	Pawnee City	2.34
Nevada	50.2	− 5.5	Sodaville	94	17	Morey	17	10	1.23	+0.49	Halleck	3.21	Beowawe	T.
New England*	54.6	− 1.5	Norwalk, Conn	86	7	Houlton, Me. VanBuren, Me.	22 22	3 5	1.82	−1.80	Madison, Me.	3.73	Norwalk, Conn	0.69
New Jersey	61.4	+ 1.0	Bridgeton	89	12, 28	Layton	22	2	1.71	−2.54	Clayton	3.94	Somerville	0.42
New Mexico	59.5	− 1.8	Carlsbad	98	27, 29	Tres Piedras	22	11	0.56	−0.47	Eagle Rock Ranch	3.66	12 stations	0.00
New York	55.1	− 0.1	Coeymans	90	15	Bouckville Paul Smith	18 18	2 2	2.08	−1.15	Ripley	4.70	Athens	0.41
North Carolina	69.2	+ 2.1	Monroe, Pinehurst Tarboro	90 90	30 29	Linville	31	2	6.69	+2.56	Randleman	11.40	Eagletown	2.48
North Dakota	50.1	− 2.8	Edmore	88	23	Willow City	10	4	3.05	+1.18	Wahpeton	6.29	Washburn	1.12
Ohio	60.7	− 0.6	Ironton New Waterford	93 93	4 4	Greenville, Orangeville. Wauseon	26 26	21 1	5.63	+2.06	Cincinnati	9.52	Green Hill	3.03
Oklahoma and Indian Territories.	69.4	+ 0.2	Goodwater, Ind. T	94	30	Kenton, Okla	35	6	7.51	+1.38	Fort Sill, Okla	15.65	Woodward, Okla	1.13
Oregon	53.0	− 1.4	Blalock Grants Pass John Day	92 92 92	30 15 16	Riverside	19	20	2.47	+0.22	Nehalem	8.59	Burns	0.53
Pennsylvania	60.8	+ 0.9	Lewisburg, Lock Haven.	93	4	Pocono Lake	22	2	2.59	−1.68	Lycippus	5.17	Point Pleasant	0.56
Porto Rico	76.6	....	Central Aguirre	98	4, 6	Adjuntas	53	11	6.78	....	Rio Blanco	16.47	Guanica Central	1.28
South Carolina	73.4	+ 1.5	Seivern	99	30	Liberty	42	21	5.72	+2.40	Smiths Mills	9.50	Batesburg	2.95
South Dakota	53.0	− 4.4	Oelrichs	91	21	Cheyenne Agency	22	5	5.83	+3.37	Vermillion	9.51	Ashcroft	1.36
Tennessee	68.7	+ 2.7	Arlington, Union City.	93	29	Rugby	34	1	5.98	+2.25	Santa Fe	10.56	Bristol	2.20
Texas	74.8	+ 1.5	Fort McIntosh Fort Ringgold	102 102	25 3dat's	Hereford	34	8	4.82	+0.94	Sulphur Springs	16.00	El Paso	0.03
Utah	52.3	− 4.8	Utah Lake, P. S. Rockville	96 96	18 31	Coyote Grayson	18 18	11 10	1.77	+0.74	Ogden No. 2	4.25	Loa	0.10
Virginia	66.6	+ 1.8	5 stations	92	29, 30	Quantico	31	2	4.76	+0.67	Columbia	9.58	Bristol	2.20
Washington	54.2	− 1.2	Mottingers Ranch Zindel	90 90	30 16	Hatton, Republic	21	1	2.66	+0.41	Ashford	8.56	Wahluke	0.14
West Virginia	64.2	+ 1.7	Sutton, Weston	96	4	Bayard	26	24	4.95	+1.11	Point Pleasant	7.96	Martinsburg	1.90
Wisconsin	53.6	− 2.9	Prairie du Chien	92	4	Koepenick	18	1	5.33	+1.64	Portage	7.64	Spooner	2.66
Wyoming	48.0	− 3.5	Basin Torrington	89 89	17 31	Little Medicine	10	5	3.18	+1.18	Fort Washakie	6.31	Evanston	0.86

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 47 stations, with an average elevation of 508 feet. ‡ 131 stations.

tributed. Winter wheat and oats began to head toward the middle of the month, the heads filling well. Spring planting was vigorously prosecuted, practically all the corn being in the field by the close of the month and the transplanting of tobacco well advanced. Good stands of spring oats were secured. Minor crops, except grass for hay, did well. The outlook for fruit was not good, apples especially dropping heavily from the trees.—*Edward A. Evans.*

Washington.—Unseasonable cool weather during the first twenty-four days prevented crops from growing rapidly, but the rainfall was ample and well distributed, doing great good to all crops. Heavy frosts on several nights shortened the fruit crop nearly one-half in many localities, cut back vegetables, and even wheat in low-lying valleys. During the last week, which was warm and sunshiny, wheat and all other crops made fine progress, so that the outlook became excellent.—*G. N. Salisbury.*

West Virginia.—Owing to the wet weather during the second and third weeks, planting and cultivation were considerably retarded, but rapid progress followed during the fourth week, and planting was practically completed. At the close of the month potatoes were making good growth and gardens, sweet potatoes, millet, wheat, rye, and oats were

in good condition and doing well; the prospects were for about a half crop of apples, but were not very encouraging for cherries, peaches, pears, and plums.—*E. C. Vose.*

Wisconsin.—The weather was characterized by an excess of precipitation, especially in the southern and central counties, and a deficiency of temperature and sunshine. The continued wet weather retarded corn planting, but was generally favorable to the growth of grass and grain crops. Frosts, more or less severe, occurred in the central and northern counties, and light snow was recorded on the 8th and 9th, but no material damage resulted.—*W. M. Wilson.*

Wyoming.—The month was unusually cool, the mean temperature for the first half of the month averaging about 6° per day below the normal. The precipitation was heavy and well distributed. At the close of the month, ranges were in excellent condition, and meadows gave promise of a large crop of native hay. The cool, wet weather delayed seeding and at the close of the month, gardens, grain, and alfalfa, while looking well, were much later than usual.—*W. S. Palmer.*

SPECIAL ARTICLES.

STUDIES ON THE DIURNAL PERIODS IN THE LOWER STRATA OF THE ATMOSPHERE.

By Prof. FRANK H. BIGELOW.

IV.—THE DIURNAL PERIODS OF THE TERRESTRIAL MAGNETIC FIELD AND THE APERIODIC DISTURBANCES.

THE DIURNAL VARIATIONS OF THE TERRESTRIAL MAGNETIC FIELD.

In the years 1889–1891 I computed a series of hourly magnetic deflecting vectors for 30 stations, in polar coordinates, s = total vector, σ = the horizontal component, α = the angular altitude positive above the horizon, β = azimuthal angle counted from the north point of the magnetic meridian through the west = 90°, south = 180°, east = 270°. These were derived from the rectangular variations, ΔH horizontal force positive northward, ΔD declination positive westward, ΔV positive zenithward, by means of a simple scale diagram containing polar and rectangular coordinate systems at the same center. This presentation of the available data of observation included the diurnal variation of the magnetic field, and also the variation from day to day eliminating the hourly periodicity. The resulting tables are bulky and there has been no opportunity to publish them *in extenso*, but brief summaries of the subject matter have appeared in several places[1]. This work has aroused some critical discussion, but for the greater part of an academic character which threw little additional information upon the solution of the numerous difficult problems in solar physics and cosmical meteorology that are involved. It is quite evident that the authors of the comments did not always have in mind the details or the minor facts which must be accounted for in a final solution. It is easy to propose a vague general theory, but to bring it down to exact harmony with the many special peculiarities of the varying magnetic field is no easy problem to resolve.

In 1889 Schuster[2] published his solution for the diurnal variation of the *vertical* force derived from four stations, and ascribed to the assumed counterpart electric currents to a sensitive state of the *upper* atmosphere. In 1897 von Bezold[3] further discussed the subject as a continuation of the same data. In 1902 H. Fritsche[4] computed the variations from the difference data, ΔH, ΔD, ΔV, by means of Gaussian coefficients, and likewise attributed the magnetic effects to supposed electric currents in the upper atmosphere. In his paper of 1903, Adolph Schmidt[5] has adopted the method of deflecting vectors, and in his other papers seems to favor an electric current system in the high strata. Also, A. S. Steen[6] has worked out an elaborate system of upper air electric currents to account for the diurnal variation of the magnetic field.

Other writers, W. Sutherland, A. Nippoldt, W. van Bemmelen, J. Liznar, Carlheim-Gyllenskiöld, Ch. Chree, and L. A. Bauer seem to favor a solution of the same character.

I must confess that, aside from the entirely vague nature of this hypothesis, I have never been able to concede that it contains the true germ of the solution of the problem. That theory has received much additional popularity from the supposed bombardment of the upper strata of the earth's atmosphere by the ions ejected from the solar surface and transported to the region of the earth's orbit by the mechanical pressure of light, which were described as thereupon inducing the required electric currents. It was quite impossible to understand how such a general action of currents in the upper strata could produce the strongly localized effects observed at the surface of the earth, which so persistently follow the meteorological elements both diurnally and annually. I have, accordingly, (1) argued against the efficiency of these hypothetical upper strata electric currents to produce the details noted in the magnetic field, and I have (2) endeavored to show that the general motions of the atmosphere and the cyclonic and anticyclonic actions can not account for the observed phenomena, taken the world over, as shown by my 30-inch globe, model of 1893.

It is true that my own working hypothesis was not complete even in my own mind, and I have supposed there are steps in the series of causes and effects that still require to be added. My view was simply this, that the sun's electromagnetic or radiant field of energy falling upon the atomic and molecular constituents of the earth's atmosphere transformed them into temporary magnetic states, by polarizing some of them *in situ*, that is, throughout the strata traversed by the solar energy. These temporary magnets produced a quasi magnetic field which deflected the normal field as observed. The deflecting forces were the products of the physical processes involved in this action of the radiation upon the atoms and molecules of the atmosphere. This theory was constructed before the phenomenon of ionization of the constituents of the terrestrial atmosphere by solar radiation had been discovered, and, of course, there was little scientific material to justify my hypothesis at that time. Furthermore, after the discovery of the existence of positive (+) ions and negative (—) ions as constituents of the atmosphere had been made, it still remained impossible to match the computed magnetic deflecting forces with the pressure and temperature period of diurnal variation as observed at the *surface* of the earth. The search for conclusive evidence of the synchronism of magnetic vectors and surface temperatures and pressures was always unsuccessful, but, fortunately, this defect now seems to have been overcome by the results of the computations summarized in this present series of papers upon diurnal pressure and temperature waves in the free air above the surface within one mile of the ground. The desired synchronism seems to be so perfect as to leave little ground for further doubt that the diurnal variation of the earth's magnetic field is due to the movement of the positive (+) ions of electricity in the lower strata of the atmosphere in streams that are induced and controlled chiefly by the diurnal temperature waves that prevail in the lowest strata. I shall, accordingly, consider this paper as a supplement to chapter 4 of Bulletin No. 21. The description of the magnetic vectors there given is correct and in agreement with the systems derived by later computers, but the process of producing them, as now understood, is in accordance with the facts that have been worked out since that paper was written.

[1] Weather Bureau Bulletin No. 2, 1892. Astrophysical Journal, October, 1893. American Journal of Science, December, 1894, August, 1895. Weather Bureau Bulletin No. 21, 1898. Weather Bureau Annual Report, 1898-99, chapter 9. Eclipse Meteorology and Allied Problems, 1902, chapter 4.

[2] The Diurnal Variation of Terrestrial Magnetism. A. Schuster, 1889.

[3] Zur Theorie des Erdmagnetismus. W. von Bezold, 1897.

[4] Die Tägliche periode der Erdmagnetischen Elemente. H. Fritsche, 1902.

[5] Eine Sammlung der wichtigsten Ergebnisse erdmagnetischer Beobachtungen. A. Schmidt, 1903.

[6] The Diurnal Variation of Terrestrial Magnetism. A. S. Steen, 1904.

THE DIURNAL MAGNETIC VECTORS AS THE EFFECT OF THE DIURNAL TEMPERATURE WAVES UPON THE REDISTRIBUTION OF THE POSITIVE IONS IN THE LOWER STRATA OF THE ATMOSPHERE.

This subject can be best presented to the reader by making a compilation of the vectors of the diurnal deflecting magnetic forces and as computed for the same latitudes as those represented by the meteorological stations that have been used in the comparison. For this purpose the following five stations have been selected, as they are located in the North Temperate Zone, but in widely distributed longitudes: Washington, Paris, Vienna, Tiflis, and Zi-ka-wei. Properly, Zi-ka-wei belongs partly to the Temperate Zone belt and partly to the Tropic Zone belt, magnetically considered, because it is so far from the north magnetic pole as to be immersed in the tropical influence during several months. Although this affects the azimuth of the hours during the night, I have not removed it from the group of stations. The computed values of s, a, β are extracted from the tables described in chapter 4, of Bulletin No. 21, and an example is given in full for the months of February and August in Table 10, "Hourly values of the polar coordinates, s, a, β, at five stations in the North Temperate Zone". The mean values were computed for each element at every hour, and these are given for each month in Table 2, "Vectors of the diurnal magnetic deflecting forces". s is in units of the fifth decimal or 0.00001 of the unit of the C. G. S. system; $a =$ the altitude angle positive above the horizon; $\beta =$ the azimuth angle counted from the north through the west.

It is difficult to exhibit the results of the Tables 10 and 11 on a diagram of only two dimensions, and I have made use in my studies of globe models constructed of rubber balls with pins for vectors, or else the large 30-inch globe model already mentioned. However, a drawing has been made in fig. 55, "Diurnal variation of the magnetic vectors s, a, β for latitudes $+30°$ to $+60°$". The vector length s and the vertical angle a are plotted for each month, and the direction in azimuth β is laid down only for January and July, as the variation in this element is not very great in the course of the year. We should, therefore, interpret the vectors as follows: The vector $(s\ a)$ should be understood to stand in the plane of the azimuth β, and make with it the angle a which is here given. Generally, the vectors from 8 a. m. to 7 p. m. are directed toward the south, and those from 8 p. m. to 7 a. m. toward the north. As my purpose is to consider chiefly the relation of the streams of + ions in the air to the vector $(s\ a)$ I have practically sacrificed the azimuth in the diagram. On the globe model the entire system is clearly displayed and it should be studied in that way.

On fig. 55 there are seen to be four critical points in the distribution of the diurnal vectors:

(1) The first point marks a sudden increase in the value of the deflecting force s up to a maximum, and it occurs in the forenoon, ranging from about 8 a. m. in winter to 6 a. m. in the summer. This is the hour at which the azimuth β shifts from the northern to the southern quadrants. About two hours later the vertical angle a passes through 0° so that the vector changes from below to above the horizon.

(2) The second point occurs at 11–12 a. m. in winter and 10–11 a. m. in summer, where the azimuth β shifts from east to west through the south, this being the well-known reversal of the needle before noon. The value of s at this point is at a slight minimum relative to its values earlier and later; this midday minimum appears in nearly every month of the computation, but especially in summer.

(3) The third point occurs after the true midday maximum of s, about 3 p. m., where the vector $(s\ a)$ changes from above to below the horizon, and a passes again through the zero value of the angle. This point changes from about 2 p. m. in winter to 4 p. m. in summer, thus moving in the opposite direction from midday to that indicated in the forenoon vectors.

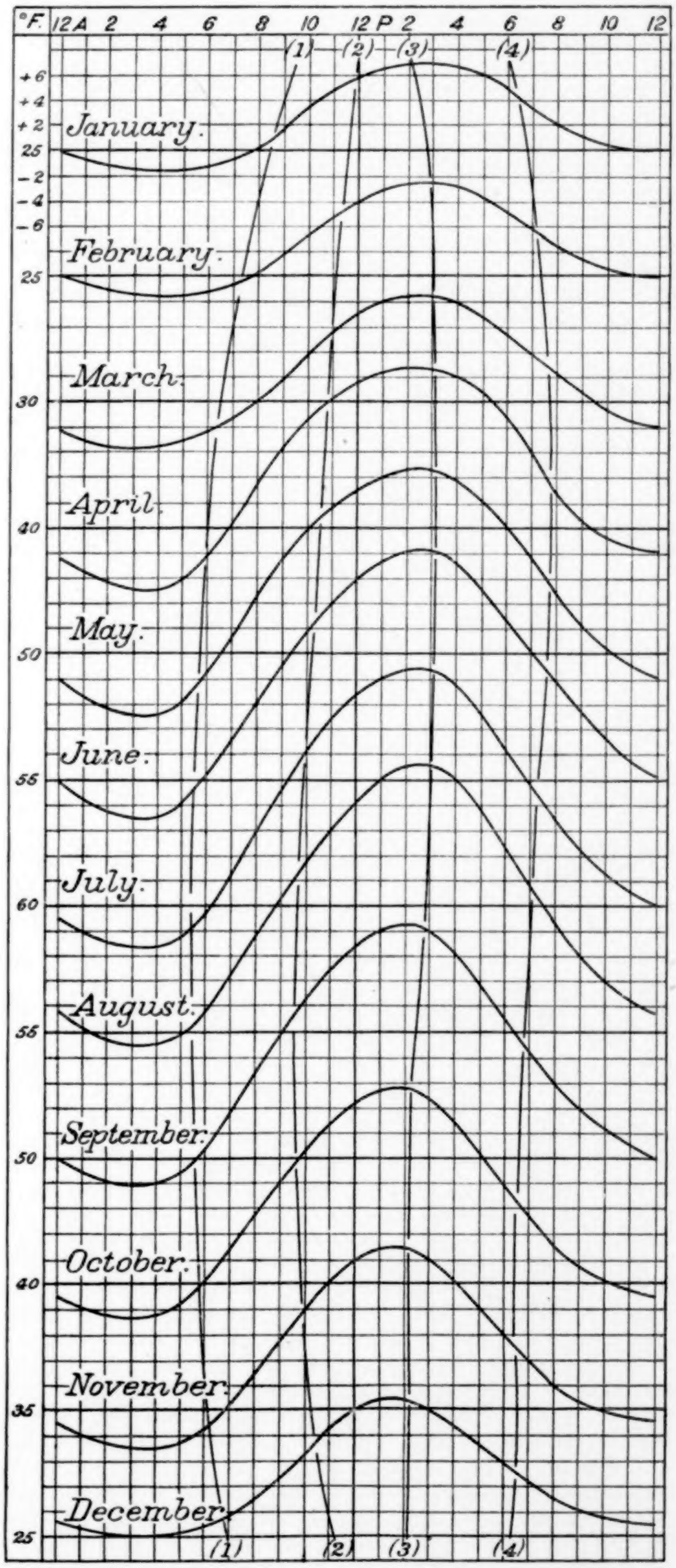


Fig. 56.—The annual variation of the surface temperature at Blue Hill.

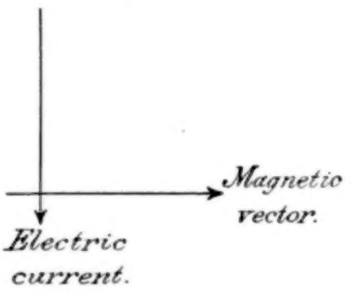
(4) The fourth point is where the azimuth β shifts from the first and second quadrants to the third and fourth, and it occurs at about 6–7 p. m. in winter, but at 7–8 p. m. in the summer, at the time of the setting of the sun. On fig. 55 these four special points in the system of diurnal vectors are indicated by the four lines marked (1), (2), (3), (4), and by

their course they show that the entire action which produces this magnetic disturbance of the normal field, contracts in time toward noon in the winter, and spreads away from it in the summer. This remarkable change in the location of the turning points is related without doubt to a similar change in the diurnal distribution of the temperature in the lower strata of the atmosphere, which must be closely associated with the magnetic variations.

In order to show how exactly these two phenomena synchronize in time during the course of the year, I have transferred to fig. 56 from figs. 14–25 the surface temperatures as observed at Blue Hill, plotting them in the sense indicated by the coordinate values. If the line (1) is drawn at the locus of the first active rise of temperature, at about two hours later than the minimum, the course is marked at an earlier hour in summer than in winter. The line (2) is drawn at about halfway up the forenoon temperature slope; line (3) at the maximum of the temperature, and line (4) at about halfway down the afternoon temperature slope. On comparing the lines (1), (2), (3), (4) of fig. 56 with those of fig. 55, it is observed that the annual curvature of the lines is generally so much in agreement as to make it very probable that the magnetic field and the temperature are both direct effects of the solar radiation, which itself has an entirely similar course to these in the North Temperate Zone. Now, since it is well known that this diurnal temperature effect is confined to the lower strata of the atmosphere, within two miles of the surface, I have been unable to concede that the diurnal magnetic variations can be caused by electric currents in the *upper* strata of the atmosphere, as assumed by Professor Schuster and other magneticians, or that it can be caused by a bombardment of the *upper* strata by the ions transported in the solar radiation, as supposed by Professor Arrhenius and other physicists. While I have been unable to relinquish my belief in a cause located in the *lower* strata of the atmosphere, it has been an exceedingly difficult thing to discover a substantial physical cause that will fix the exact location of a system of electric currents, or other source of these magnetic vectors, in this region, and, indeed, I had not been able to do so before arriving at the results of the kite observations as exhibited in the preceding papers of this series. We have been led, at length, very naturally to see in the movement of the positive (+) ions in streams, whose directions are determined by the temperature distributions in the lower strata, a sufficient cause for the diurnal variation of the electric potential field, and I shall now show that this cause also accounts equally well for the diurnal variation of the magnetic field in the North Temperate Zone.

The general relations may be represented schematically by fig. 57, "The probable relations between the temperature waves, the streams of positive (+) ions, and the magnetic vectors in the lower strata of the atmosphere". Let A represent the surface of the earth which is charged with negative electricity. A portion of this charge is derived from the ionized contents of the atmosphere, due to the action of the short waves of the solar radiation upon the constituents of the atmosphere, especially the aqueous vapor located within an arch spanning the Tropics. Another portion of the negative charge is probably derived from inside the earth, and is due to the excess of differential circulation of the negative (−) ions over the positive (+) ions in the atomic conflict at the prevailing high temperature and pressure, by which more of the negative electric ions are detached from the atoms and in circulating are polarized by the earth's rotation so as to produce the internal magnetism of the earth and an electrostatic charge at the surface. If the negative ions rotate more rapidly than the positive, as with the velocity of light, the deflecting force due to the earth's rotation must be large, and tend to cause these ions to move in planes perpendicular to the axis of rotation. This will cause an internal magnetic field directed from north to south.

The surface charge of negative ions is supposed to rest quite steadily on the earth, or within it, while the positive (+) ions of the atmosphere rise and fall from one stratum to another according to the change in the air temperatures, as if the positive (+) ions had an affinity for certain temperatures, which they seek through vertical and horizontal motions. Let B represent the ordinary surface temperature wave, with which it has never been possible to associate the diurnal magnetic vectors. Let C represent the semidiurnal temperature wave in the lower strata of the atmosphere as integrated in the diurnal convections, generally within half a mile of the ground. The maximum temperature occurs at 3 a. m. and 3 p. m., and the minimum at 8 a. m. and 8 p. m., both of these subject to the annual variation in time already indicated. Let D represent the probable streams of positive ions, directed vertically upward at 3 a. m. and 3 p. m., but downward at 8 a. m. and 8 p. m. It should be observed that at 3 a. m. the vertical upward current of the semidiurnal wave is really neutralized by the downward current of the surface wave, and that during the night hours we should have small residual motions on the whole of a downward direction; that, at 8 a. m. and 8 p. m. the downward semidiurnal waves prevail because the surface temperatures are nearly normal to the day and the convectional currents are producing lower temperatures; and, that, at 3 p. m. both the diurnal and the semidiurnal waves unite in a common upward vertical component. We may assume, then, that the positive ions descend vertically at 8 a. m. and 8 p. m., but ascend vertically at 3 p. m. The accompanying adjacent streams on the preceding side of the 8 a. m. vertical, bend to the left in the early morning hours, but to the right after that hour. These latter naturally recurve, becoming horizontal at 10 a. m. to 11 a. m. in order to ascend in the warm midday current. At 8 p. m. the positive (+) ions first descend, recurve by becoming horizontal at 6 p. m. to 7 p. m. and ascend in the warm afternoon current, while those farther to the right slowly descend throughout the night. Let E represent the corresponding magnetic deflecting forces, which are generally found to be at right-angles to the electric streams as thus located and always directed in the same sense.



This remarkably consistent corelation of cause and effect throughout the diurnal fields is greatly in favor of the theory here ascribed. Finally, it should be remembered that this entire temperature system is moving as indicated by the arrow F on the diagram from right to left, and that the warm wave is continuously intruding upon the cool regions to the left of it. If the positive (+) ions seek to avoid an excess of warm temperature by streaming from low levels during the hours from 10–11 a. m. to 6–7 p. m. into the higher levels with a maximum at 3 p. m., that is generally by moving upward in the warm current, the effect is to leave the positive (+) ions in the higher strata throughout the evening and night hours. There is not so much a continuous electric circuit, with the same velocity in all parts of it as in a conductor, but rather an alternate rise and fall of the electric charges at different parts of the day, that is a falling by night and a rising by day, somewhat as is indicated in the diagrams. The westward lateral movement of the diurnal system probably tends to keep

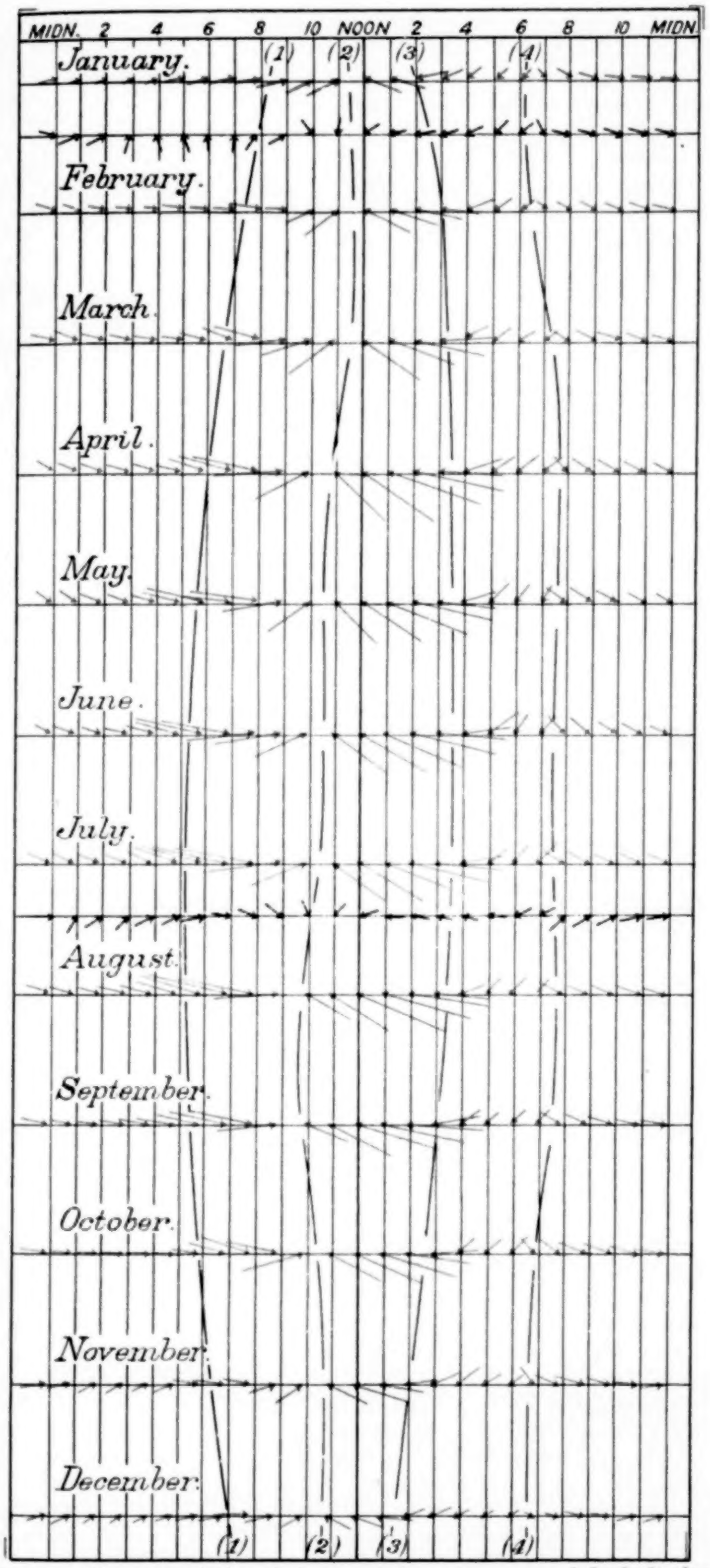


FIG. 55.—Diurnal variation of the magnetic vectors. s, a, β, for latitudes $+30°$ to $+60°$; s, a, for each month, β, for January and July.

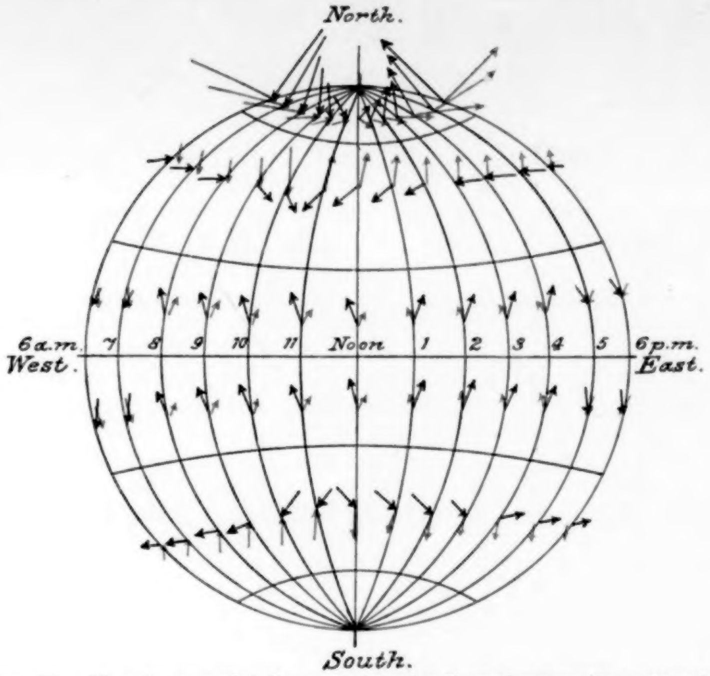


FIG. 58.—The streams of + ions causing the diurnal magnetic vectors in the Polar, Temperate, and Tropical zones of the earth.

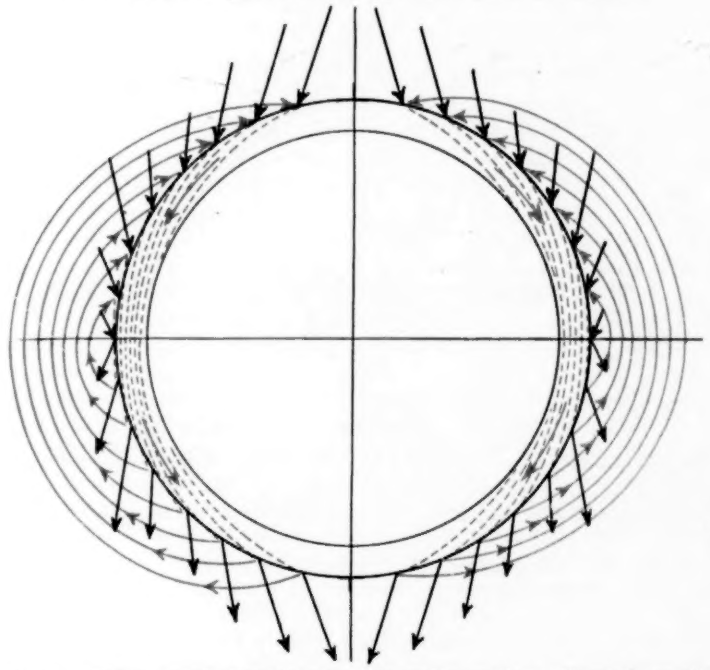


FIG. 59.—The general disturbance: Magnetic vectors directed southward and caused by a flow of + ions from south to north in the air.

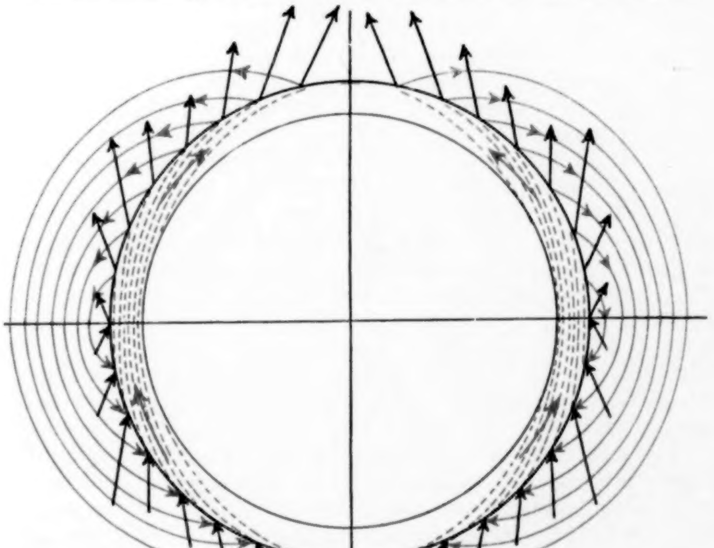


FIG. 60.—The general disturbance: Magnetic vectors directed northward and caused by a flow of + ions from north to south in the air.

Plate II.—XXXIII.

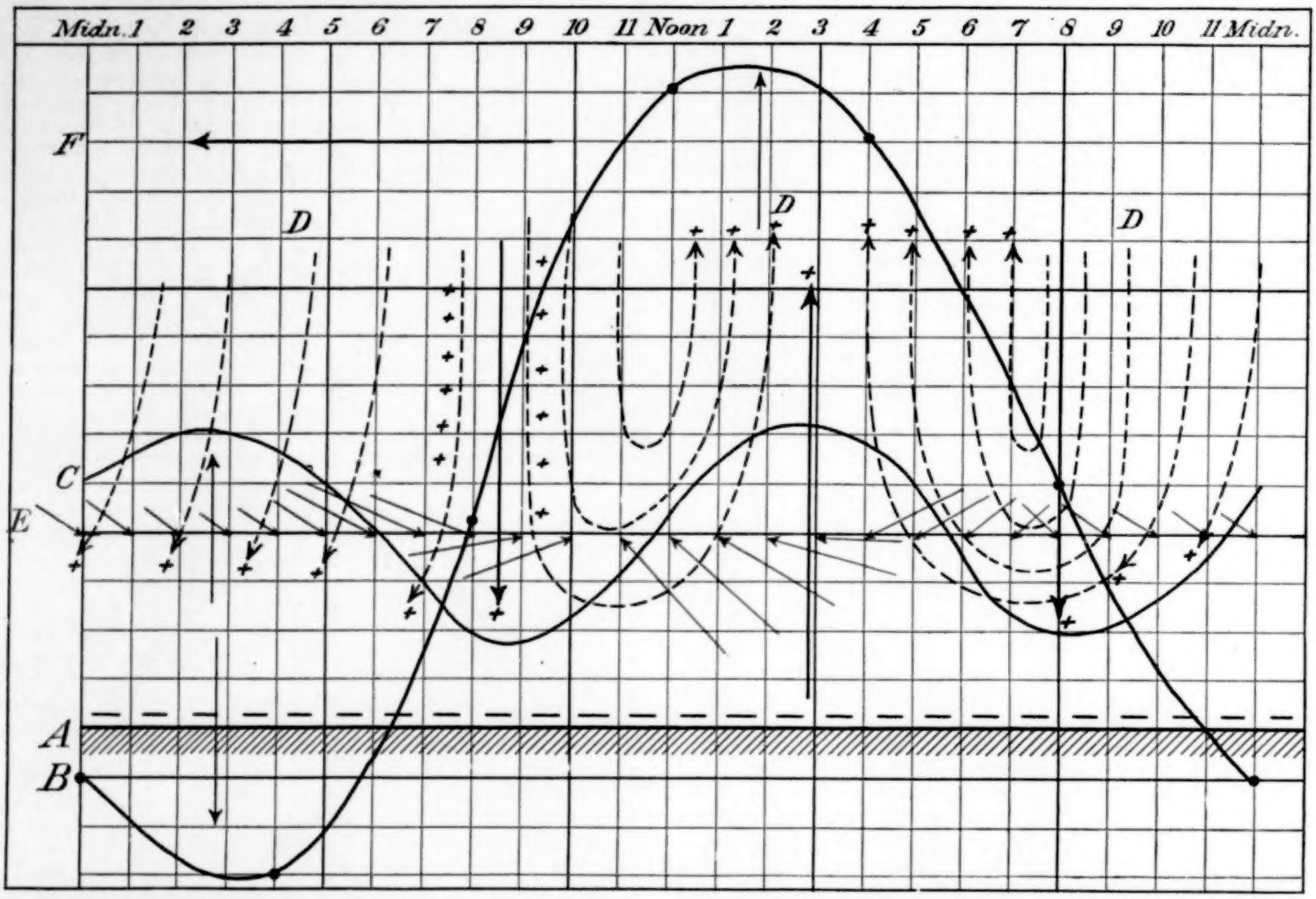


Fig. 57.—Probable relations between the temperature waves, the streams of + ions, and the magnetic vectors in the lower strata of the atmosphere.

A = negatively charged surface of earth.
B = the surface temperature wave.
C = the semidiurnal temperature wave at the height of 400–600 meters.
D = the probable stream lines of the positive ions, as moving charges.
E = the corresponding magnetic vectors.
F = direction of motion of the system.

wider open the streams of ions before noon, at 10 a. m. to 1 p. m., and to make them closer together at about 6 p. m. to 7 p. m. At the same time, as already explained, there is produced the increase of the atmospheric electric potential gradient to a maximum at 8 a. m. and 8 p. m. by the approach of the positive (+) ions to the negative (—) ions lying at the surface, also, an increase in the rate of dissipation of the two kinds of charges by the more immediate mixture and contact. It is not necessary to remark that we do not suppose that the positive (+) ions and the negative (—) ions are separated from each other so exclusively as is here indicated, but only that there is an excess of the positive (+) ions in the strata above the ground, and an excess of the negative (—) ions near the surface. It may be noted that the conflict in direction from 4 p. m. to 9 p. m. between the convection air currents and between the streams of the ions, one being upward and the other downward, is very favorable to the production of thunderstorms.

THE DIURNAL MAGNETIC VECTORS IN THE POLAR, TEMPERATE, AND TROPICAL ZONES OF THE EARTH.

Similar considerations applied to the magnetic hourly vectors which have been computed in the other zones of the earth, and described in chapter 4 of Bulletin No. 21, lead to the following conclusions, illustrated schematically in fig. 58. The normal magnetic field of the earth, positive in the Southern Hemisphere, has the horizontal component directed northward, while the vertical is upward in the Southern Hemisphere, but downward in the Northern Hemisphere. The downward positive (+) ion stream repels the north end of the magnet eastward in the North Temperate Zone, but westward in the South Temperate Zone; the upward positive (+) ion stream works in the opposite sense. Hence, the descending positive (+) ion stream from 7 p. m. to 11 a. m. (fig. 57) in the Northern Hemisphere directs the north end of the needle eastward, but in the Southern Hemisphere, westward. The ascending stream directs it westward in the Northern Hemisphere and eastward in the Southern Hemisphere. The same diurnal temperature waves, therefore, produce the required opposite magnetic effect in the respective hemispheres. In the Tropical Zone the vectors on the sunward side are directed northward for the ascending positive (+) ion streams, and southward in the night, 4 p. m. to 8 a. m. for the descending streams. In the Polar Zone the outspreading magnetic sheets on the morning side of the pole imply a descending stream of ions which is directed from left to right, or west to east; and on the afternoon side the ascending and concentrating magnetic vector sheets imply an outflowing system of positive (+) ions which ascend into regions about the surface. Generally, these magnetic vectors in the three zones require electric currents directed from west to east in the Polar Zone athwart the direction of the lines of the solar radiation; those in the Temperate Zones require lines nearly in planes from north to south, and also athwart the solar radiation field; finally those in the Tropics require positive (+) ion streams parallel to the direction of the same radiation. These three rectangular systems of electric currents evidently form those types of couples, exactly the counterparts of the three sets of magnetic couples which were described in the same chapter of Bulletin No. 21. For some reason the positive (+) ions seem to prefer to travel at right angles or else parallel to the lines of the electromagnetic radiation, even when they are passing along paths which are rendered favorable by the temperature conditions already existing in the lower strata of the atmosphere. It is evident that these prevailing conditions imply a possible solution of several important physical questions in electricity and magnetism in the earth's atmosphere, when suitable observations have been acquired. The theory which I advanced to account for the observed diurnal magnetic vectors in my preliminary papers is now much more satisfactorily stated, by such an addition to its terms as has been drawn from the process depending upon the ionization and temperature effects of the solar radiation in the lower atmosphere. Apart from clearness of exposition, it seems to me that the view there advanced, namely, that the magnetic vectors are products of the electromagnetic radiation as the result of its action on the atoms of the atmosphere is substantially strengthened. The entire subject, though intellectually more satisfactory, is also much more difficult to handle scientifically, because the intermediate steps involved in the action of the ions in relation to the temperature, must be worked out by observations in the lower strata of the atmosphere, and such data are very difficult to acquire in a reliable form.

THE SYSTEM OF DAILY MAGNETIC VECTORS, AS DISTINCT FROM THE HOURLY VECTORS.

Besides the system of hourly deflecting magnetic forces described in chapter 4, Bulletin No. 21, I also worked out a second vector system, which gives the vectors day by day, disturbing the normal magnetic field in the day intervals, taking the several successive groups of 24 hours in succession. These vectors are summarized in chapter 3, of the same bulletin, and it was there shown that they consist of vectors acting nearly in the planes of the magnetic meridians directed northward or southward as the case may be. Since the entire magnetic field of the earth is involved in these disturbances, which often run three or four days in the same direction, before reversal to the other side of the normal occurs, it is necessary to seek for a general cause instead of one that is distinctly local. The mere temperature effects of meteorological circulation can not be the dominant cause, because the two systems of conditions do not synchronize. It was also shown that this general magnetic field, taking the annual values of the vector *s*, does vary in parallel with that of the solar field as shown by the frequent number of spots, faculæ, and prominences. According to that interpretation of several phenomena which was adopted and which is probably physically correct, the sun was found to be magnetized. The solar action and the magnetic terrestrial effect undoubtedly synchronize in the long run, but there has been great difficulty in assigning so large physical fluctuations to the sun itself as seem to be required to account for the observed magnetic conditions at the earth. It has seemed to me necessary to assign to the direct magnetic field of the sun at least the function of setting in operation such terrestrial forces in the earth's atmosphere as should make up between them the required magnetic efficiency. Just what that terrestrial process is in fact, there has been trouble in detecting, and in assigning to it a sufficiently natural *modus operandi*. The violent fluctuations of the magnetic field could hardly be ascribed exclusively to variations in the normal solar electromagnetic radiations, for two reasons: (1) The sun would be a variable star of such a convulsive type as to be inconsistent with the comparatively steady flow of heat which the earth receives from it. Nor can this view be suitably modified by adding such a bombardment of solar ions as Arrhenius has suggested, because their possible efficiency is not nearly great enough to match the great magnetic fluctuations which are continually being recorded. (2) The vector system pertaining to these daily disturbances is entirely different in type from that found in the hourly variations. Indeed, I showed by the computation on Table 15, page 76, Bulletin No. 21, that in the case of strong disturbances the ordinary hourly disturbing vectors (fig. 58) are transformed hour by hour into a system of vectors like the general type (fig. 59), thus proving that these two phenomena have essentially different originating causes, so far as their effects on the observed magnetic vectors are concerned. I have not failed to recognize the difficulties of my own theories in this problem, nor have I discovered in other papers a solution which seemed in anywise competent

to account for all the conditions at the solar end and at the terrestrial end of the line of cause and effect. The following view is, therefore, suggested with the impression that it forms an excellent working hypothesis for further examination.

Taking such a group of lines of force as are to be found on charts 17, 18, of Bulletin No. 21, which shows that the magnetic force is subject to world-wide variations of the same type on the same dates, it is evident that the normal field of the entire earth is for a while disturbed by a set of vectors pointing southward, and again by a set of vectors pointing northward. The mean vectors of this system at the several latitudes of the earth were computed, and they are plotted on chart 10 of Bulletin No. 21. They have longer vectors in the polar regions and in latitudes 20° to 40° than in the latitudes 40° to 60° and 0° to 20°. I have transferred them to fig. 59, which shows the magnetic vectors s directed southward and to fig. 60, which shows them pointing northward, of course referring to two seperate occasions. This alternate action, or reversal of the entire system of magnetic deflecting forces, is the phenomenon to be explained.

By extending our notion of streams of positive (+) ions moving from point to point in the atmosphere, we have merely to suppose that on certain provocations the positive (+) ions move from one hemisphere to the other in the atmosphere, returning again through the outer shell of the earth, as indicated on the diagrams. For a southward directed magnetic system, the positive (+) ions stream from the Southern Hemisphere along the arches in the atmosphere most favorable to their movement, whether due to temperature and vapor conditions, or to special ionization and conductivity functions. This flow of the positive (+) ions induces the magnetic vectors at the surface, and the positive (+) ions stream back from the Northern Hemisphere to the Southern through the crust of the earth, thus causing the earth currents which always accompany agitation of the normal magnetic field. For a northward directed system of vectors the positive (+) ions stream from the Northern to the Southern Hemisphere in the air, and return thence through the outer shell of the earth. The magnitude of the disturbance of the normal magnetic field depends upon the intensity of the stream of ions flowing along these paths, and that is a function of the number of the ions and the velocity of their motion,

$$\lambda = e\,(n_+ v_+ + n_- v_-),$$

where e is the charge of electricity of each ion, n_+ and n_-, the number of the positive (+) ions and the negative (—) ions, and v_+ and v_-, the velocity of the same. The simultaneous occurrence of the aurora in both hemispheres is evidence of the action of the ions which, in traversing the gases of the atmosphere in the low or the high strata, produce the observed luminous effects as phosphorescence or fluorescence. It should be observed that the hourly location of the aurora frequency occurs in the regions marked out on fig. 58 by the streams of ions, that is in the early morning and the early evening hours, since there is a region of minimum of frequency stretching from 11 a. m. across the polar region to 11 p. m.

This simple explanation of the long series of interrelated phenomena, which has so long escaped a natural correlation, has much to commend it to careful consideration. The quantitative determination of the number of ions involved, and their velocity of motion in the circuit from one hemisphere to the other, will require much exact research work upon the various functions involved in the physical processes.

THE DISTRIBUTION OF THE APERIODIC DISTURBANCES.

It has been very difficult to assign to the observed disturbances of the magnetic field, that is to the large variations of a spasmodic character, like temporary storms, which occur in the normal field, a satisfactory explanation. The attempt to ascribe the physical cause exclusively to variations of the solar action *in situ*, that is in the sun itself. as for example, the sun spots, or the prominences, is attended with unusual troubles of a physical nature. The following analysis may tend to throw some light on the subject.

The disturbances which occurred at Washington, D. C., during the years 1889, 1890, and 1891 were subjected to an analysis similar to that used in other connections, by which the polar disturbance vectors σ, s, α, β, were computed for each half hour of those days on which the traces were decidedly agitated, as 1889, February 28, 29, March 5, 6, 17, and so on throughout the three years. The purpose was to fix their daily distribution as a diurnal period, and the direction from which they come upon the normal field. The mean vector for the 24 hours was,

s = 245 for β	between	315°	and	45°	that is	north;
315 " β	"	45°	"	315°	"	west;
333 " β	"	135°	"	225°	"	south.
308 " β	"	225°	"	315°	"	east.

Hence, the south quadrant receives the strongest impulse, while the east and west quadrants are more disturbed than the north quadrant. Fig. 61 contains the curve of relative numbers showing the diurnal frequency of the disturbance, the maxima being at 12 to 1 p. m. and 12 to 1 a. m. Comparing with fig. 57, it is seen that these maxima agree with the position of the maxima of intensity of the ascending stream of positive (+) ions, as determined by the temperature curve of the lower strata, that is the one located a few hundred meters above the surface. We may infer that one source of the magnetic disturbances is in the temperature waves which induce the movement of the streams of positive (+) ions, especially in a vertical direction. Hence, these hourly magnetic disturbances are specifically meteorological phenomena occuring in the lower strata of the atmosphere, and are the products of the solar radiation produced through the intermediate agency of the ionization and temperature waves.

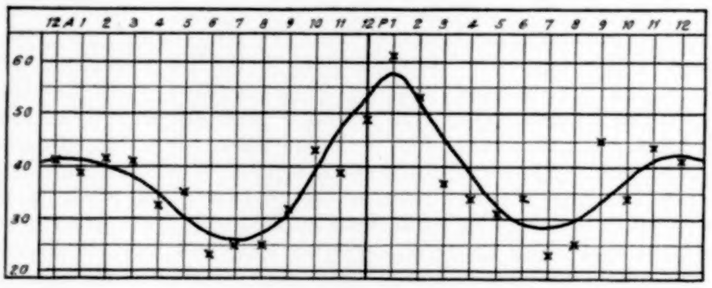


FIG. 61.—Distribution of the hourly magnetic disturbances at Washington, D. C., in the years 1889, 1890, 1891.

There is yet another cause for the other type of great magnetic storms which endure for several days, as distinct from those lasting a few hours, and cause the excessive variations in the diurnal field. In working up my data into the 26.68-day period, and deducing the resulting mean magnetic curve, as shown on chart 21, Bulletin No. 21, or by the upper curve on fig. 62, I excluded the large magnetic disturbances beyond a certain amplitude, for the sake of obtaining the normal structural magnetic impulse due to the rotation of the sun on its axis, if any such exists. The curve mentioned has been found to reappear generally, though at the expense of much waste of material in computing, to eliminate the other kinds of irregularities by mutual self destruction, in nearly all the solar and terrestrial phenomena. It, therefore, seems to point to an organized mass in the sun due to a highly viscous mass having great rigidity at immense pressure, or to a definite organic circulation. Similarly I have counted out the dates of occurrences of the magnetic disturbances recorded at Greenwich, 1882–1903, as collected by Mr. Maunder in his paper,

Monthly Notices R. A. S., November, 1904, and entered them in a table based upon the 26.68-day ephemeris. The result is shown also in fig. 62, and it seems to imply that the 26.68-day period is at the basis of the distribution of the great magnetic storms, rather than the 27.35-day period, which is the average in the sun-spot belt.

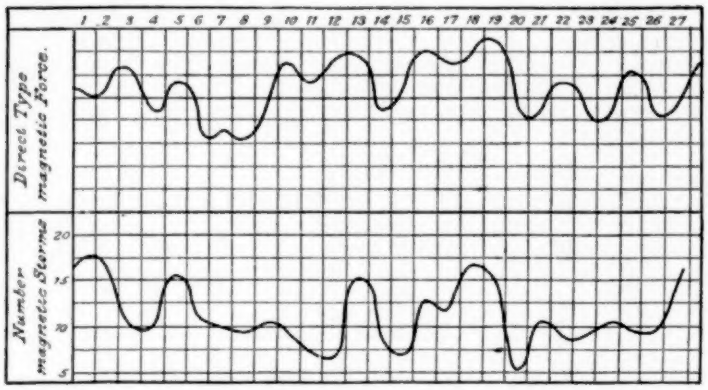


FIG. 62.—Distribution of the great magnetic disturbances in the 26.68-day period (Maunder's data).

In Terrestrial Magnetism, Vol. X, p. 12, March, 1905, Ch. Chree gives a table which shows the number of great magnetic storms, using Maunder's data, that commenced on the several hours of the day. These numbers are plotted on fig. 63 which shows that there is a distinct maximum at 1. p. m. The numbers are distributed without distinction as to hours during the night and early morning, but at 10 a. m. a pronounced increase in the number per hour set in which culminates at 1 p. m. and falls off gradually to 8 p. m. On comparing this curve, fig. 63, with that of the diurnal disturbance curve, fig. 61, it is seen that the principal maxima agree at the same hour. The inference is that the great disturbances lasting several days, as well as disturbances which are limited to a few hours in duration, each tend to concentrate about the 1 p. m. hour when the ascensional current of the positive (+) ions is strongest. From figs. 62 and 63 it is quite certain that the great disturbances have two terms entering into their composition, one belonging to the sun's atmosphere and the other to the earth's atmosphere. The final solution of this problem is evidently dependent upon a knowledge of many terms other than a mere enumeration and matching of the number of the sun spots and prominences with the magnetic traces.

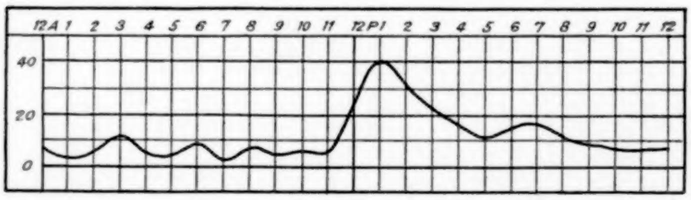


FIG. 63.—Number of great magnetic disturbances commencing at the several hours (C. Chree's Table, Terr. Mag. Vol. X, No. 1, p. 12).

The physical impulses from the sun to the earth may come in two ways, (1) by the radial path of the solar radiation, and (2) by the curved path of a direct magnetic polar field. Either of these may operate separately, or both of them may work together, to alter the normal balance among the positive (+) ions in the earth's atmosphere, and thus start them flowing in the paths indicated on figs. 58, 59, southward or northward as the case may be. As a matter of fact, the great magnetic storms lasting two or three days are found to require a deflecting vector system pointing southward, so that the positive (+) ions flow northward in the air strata. They may continue to flow as long as the solar impulse, whether of radiation or of direct magnetic field, is passing the position of the earth in its orbit. On this view the strain is removed from the original theory that the sun can not by direct action as a magnetic sphere influence the earth to the full extent required by the observations, because only a part of the energy traverses the cosmical space from the sun to the earth, while the remainder is simply due to the streams of ions in the atmosphere flowing as adjustment currents.

Enough has been shown, I believe, to make it clear, (1) that the variations of the terrestrial magnetic field are distinctly meteorological effects, and should properly be examined by the meteorologist rather than by the geophysicist; (2) that this interaction of the electric, magnetic, and temperature effects, whether at the sun or at the earth, constitutes one of the most fascinating problems open to scientific research. If the production of ions by solar action, their distribution statically and dynamically under the influence of atmospheric pressure, temperature, and vapor contents can be thoroughly worked out, the result will be to raise meteorology to a practical science of the highest rank. The numerous cross connections between radiation, whether variable or constant, the ionization in the solar and in the terrestrial envelopes, the consequent circulation of the solar mass and of the earth's atmosphere, the resulting weather and climates, make up a series of research problems of much difficulty, and yet of such promising value to all men as to justify a much greater activity on the part of astrophysicists and meteorologists than has been given to the subject of cosmical meteorology in the past.

THE COMPONENTS OF THE DIURNAL WIND VELOCITY.

In chapter 9, of the International Cloud Report, some account was given of the relation between the distribution of the pressure waves and the magnetic field vectors in the polar regions, as well as in the Tropics and middle latitudes. It was shown that the diurnal wave in the Tropics and the temperate zones advances over the earth as a long double wave extending from latitudes +60° to −60°, but that in the Polar Zone a single wave of maximum crosses the poles with a phase about 90° different from either of the maximum pressure waves in lower latitudes. It appears that the distribution of the magnetic vectors is closely associated with this single pressure wave in the Arctic regions, but I could give no suitable explanation of this sudden transition from the double to the single wave at the latitude 60°. It now appears that the semidiurnal waves are due to temperature effects and convection currents in the lower strata, as within 600 meters of the surface, and that above them from 600 meters to 3000 meters there exists a single temperature wave, located halfway between them, which likewise is produced as the result of the temperature distribution in the lower strata. Now, since in the temperate zones, the double temperature waves exist at low levels and the single temperature wave at high levels, it is quite likely that this single wave descends to the surface in the Polar Zone, and induces the single pressure wave which accompanies it. Thus, the single temperature and pressure waves rest on the surface in the polar zones, but pass overhead as an arch in the temperate and the tropical zones, higher in the Tropics than in the middle latitudes. This is quite similar to the distribution of the aqueous vapor contents in an arch, and it is probable that the positive (+) ions travel along this high pressure arch through the earth's atmosphere rather than by any other route. The vectors of figs. 59, 60 show that long vectors occur in the Polar Zone, and in the latitudes between the eastward drift of the temperate zones and the westward drift of the Tropics, that is to say, in the belts of the earth where the high pressure distributions come to the surface. The cloud belts of the Temperate Zone, latitudes 40° to 50°, and near the equator, +10° to −10°, apparently impede the circulation of the streams of ions and so produce short disturbing vectors in those belts.

Finally, by comparing the diurnal wind vectors, as deduced from the surface and the free air observations, it will be seen that they harmonize closely with the other results of this analysis. I may remark in conclusion, that there seems to be little need to adopt the theory of Arrhenius, that the magnetic disturbances are due to a bombardment of the solar ions traversing the space between the earth and the sun, because the disturbance of the normal temperature, or the normal electrical field and magnetic field by radiation effects, or by the direct magnetic effects, is sufficient to set up a counterbalancing circulation of the ions. The entire system of the sun and the earth constitute a delicately balanced wireless telegraphic system, and the ions may be regarded as sensitive coherers, which respond to every impulse tending to disturb the equilibrium. It should be especially observed that the variation of the magnetic field at the surface most effectively and simply integrates the entire efficient energy expended in these several types of force. If the temperature waves in the lower strata disturb the ions, and these induce the magnetic deflecting forces, then, in the inverse order, the magnetic force at the ground measures the nature of the temperature wave passing overhead. In this aspect of the case the magnet can be made to register the temperatures in the lower strata of the air at least indirectly, and probably very efficiently, when the function becomes fully understood, and in this sense a magnetic observatory is essential to the progress of the higher meteorology.

TABLE 10.—*Hourly values of the polar coordinates s, α, β at five stations in the North Temperate Zone.*

W. = Washington. P. = Paris. V. = Vienna. T. = Tiflis. Z. = Zi-ka-wei.

FEBRUARY.

Hours.	s W	s P	s V	s T	s Z	Means.	α W	α P	α V	α T	α Z	Means.	β W	β P	β V	β T	β Z	Means.
12a	4	10	9	9	7	8	−28	− 5	−12	−12	− 8	−13	273	276	302	297	180	265
1...	3	5	8	10	6	6	−25	−10	− 7	−11	−13	−14	234	281	320	281	180	250
2...	2	3	13	7	7	6	−26	0	+ 4	−18	− 7	− 9	349	288	337	286	195	271
3...	1	4	8	3	7	5	−27	0	0	0	− 8	− 7	280	280	336	315	195	279
4...	2	3	9	3	5	4	−20	0	− 6	0	0	− 5	292	288	340	378	180	296
5...	4	3	16	5	6	7	−46	+17	− 7	+11	−18	− 9	309	315	352	360	190	305
6...	4	5	15	6	7	7	−23	+11	− 4	+ 9	− 8	− 3	309	323	348	398	180	312
7..	7	7	18	8	3	9	−21	+ 9	− 6	0	+ 9	− 2	313	333	347	253	162	282
8...	10	7	22	13	9	12	−10	+ 8	−10	0	− 6	− 4	301	326	329	322	206	297
9...	11	6	29	14	9	12	− 4	+ 9	− 4	+12	0	− 3	289	279	290	294	308	292
10...	10	7	20	10	13	12	+ 8	+27	+10	+37	+18	+20	271	211	236	263	305	257
11...	8	11	34	10	12	15	+23	+34	+25	+61	+28	+34	228	144	200	142	333	209
12 p	12	16	40	16	15	20	+22	+23	+22	+40	+23	+26	153	106	160	100	8	105
1...	16	19	31	18	19	21	+13	+15	+16	+27	+19	+18	128	93	145	90	27	97
2...	16	15	31	16	16	19	+13	+12	+13	+11	+ 7	+11	100	94	124	94	33	89
3...	16	10	24	14	12	15	+ 9	0	− 3	− 4	+ 5	+ 1	87	96	111	116	34	89
4...	10	7	15	11	7	10	+12	−16	−16	−15	−45	−16	81	117	102	128	36	93
5...	6	4	10	10	5	7	+23	−35	−29	−23	−90	−31	86	90	122	129	0	85
6...	6	4	6	9	6	6	+18	−57	−45	−36	−45	−33	91	90	75	164	180	120
7...	3	3	4	7	5	4	+23	−45	−65	−45	−22	−31	245	295	65	217	180	200
8...	2	5	6	8	10	6	−23	−21	−45	−45	0	−27	279	215	333	210	191	265
9...	4	6	10	8	9	7	−26	−18	−29	−30	− 6	−22	256	288	306	254	167	257
10...	6	7	12	8	7	8	−25	− 8	−20	−40	− 8	−20	271	286	304	260	172	263
11...	6	8	13	8	3	8	−31	− 7	−13	−30	−18	−20	286	278	303	270	163	260
12...	4	10	9	9	7	8	−28	− 5	−12	−12	− 8	−13	272	276	302	297	180	265

AUGUST.

Hours.	s W	s P	s V	s T	s Z	Means.	α W	α P	α V	α T	α Z	Means.	β W	β P	β V	β T	β Z	Means.
12 a	5	10	13	9	3	8	−10	−17	−13	−21	−18	−16	360	315	328	320	135	292
1...	7	9	10	10	2	8	+ 5	−13	−17	−17	−26	−14	445	319	315	307	360	329
2...	6	8	9	9	7	8	+ 8	−15	−18	−13	−26	−13	341	320	297	306	342	321
3...	5	9	13	10	11	10	+12	− 6	−12	−17	−33	−11	352	305	300	294	325	315
4...	8	10	13	11	14	11	+19	−11	−18	−22	−30	−12	292	286	297	294	331	300
5...	10	12	18	16	20	15	− 2	−14	−20	−22	−33	−18	303	279	298	287	320	297
6...	21	16	18	23	40	24	− 8	−15	−22	−18	−25	−18	285	266	280	270	297	280
7...	31	21	20	32	49	31	− 1	−11	−20	−16	−16	−13	272	252	279	254	278	267
8...	36	23	22	35	46	32	− 1	− 4	−21	− 9	−10	− 9	151	232	236	240	271	226
9...	34	22	23	31	25	27	+ 6	+14	− 9	+ 5	−21	− 1	225	218	209	217	265	227
10...	25	20	28	21	12	21	+18	+30	+15	+23	+58	+29	183	174	177	186	90	162
11...	22	26	35	22	31	27	+22	+35	+31	+40	+26	+31	155	133	157	114	80	128
12 p	32	35	40	35	43	37	+13	+30	+32	+27	+15	+23	112	96	118	87	78	98
1...	32	34	37	40	43	37	+11	+20	+25	+17	+ 8	+16	93	97	101	77	72	88
2...	29	30	30	37	32	32	+ 4	+10	+15	+14	+ 4	+ 9	81	97	84	71	67	80
3...	21	20	21	27	27	21	− 5	− 6	+13	+ 8	− 3	+ 2	71	86	81	72	65	75
4...	13	13	12	15	3	11	−29	−33	−14	0	−18	−19	51	80	85	74	90	76
5...	9	9	4	6	16	9	−43	−72	−63	−39	−15	−46	38	45	90	90	165	86
6...	7	10	4	4	23	10	−46	−72	−45	−75	−16	−51	14	315	315	180	190	63
7...	5	10	9	4	22	10	−40	−45	−20	−58	−15	−36	350	343	346	90	177	45
8...	6	11	12	5	15	10	−21	−33	−20	−63	+ 3	−27	348	334	350	360	176	314
9...	5	10	14	6	9	9	−26	−29	−17	−45	0	−23	345	319	346	329	262	320
10...	6	11	12	6	11	9	−31	−22	−20	−31	−10	−23	340	315	338	322	165	296
11...	7	9	14	7	11	10	−17	−20	−17	−27	−20	−20	348	315	333	308	165	274
12...	5	10	13	9	3	8	−10	−17	−13	−21	−18	−16	360	315	328	320	135	292

TABLE 11.—*Vectors of the diurnal magnetic deflecting forces.*

β azimuth angle, N. = 0°, W. = 90°, S. = 180°, E. = 270.
s in terms of 0.00001 C. G. S. unit.
α vertical angle, positive to zenith.

Hours.	January. s	January. α	January. β	February. s	February. α	February. β	March. s	March. α	March. β	April. s	April. α	April. β
		°			°			°			°	
12 a....	5	+ 3	258	8	−13	265	9	−11	285	7	−30	290
1......	4	+16	388	6	−14	259	8	−19	288	8	−22	295
2......	4	+19	296	6	− 9	271	8	−14	291	8	−18	294
3......	4	+23	343	5	− 7	279	8	−10	304	9	−12	288
4......	5	+14	363	4	− 5	296	8	− 9	298	9	−14	286
5......	6	+10	373	7	− 9	305	7	− 9	331	10	−14	285
6......	7	+10	365	7	− 3	312	10	−11	339	14	−19	289
7......	10	+ 6	354	9	− 2	282	12	−21	311	21	−15	234
8......	10	+ 3	321	12	− 4	297	17	−17	278	27	−11	259
9......	12	+10	298	12	− 4	292	21	− 2	266	26	+ 1	241
10......	11	+21	217	12	− 3	257	20	+14	240	23	+26	221
11......	13	+24	176	15	+20	209	22	+35	182	26	+44	161
12 p....	16	+20	120	20	+34	105	27	+34	103	35	+34	94
1......	17	+ 9	101	21	+26	97	29	+20	95	40	+19	84
2......	13	− 7	98	19	+18	89	29	+12	89	36	+12	81
3......	8	−21	99	15	+11	89	21	− 2	86	25	− 1	78
4......	6	−36	115	10	+ 1	93	12	−14	94	16	−16	84
5......	5	−37	131	7	−16	85	8	−31	134	11	−33	100
6......	5	−40	120	6	−31	120	6	−28	122	11	−37	140
7......	5	−47	207	4	−33	200	6	−31	123	9	−37	131
8......	6	−30	264	6	−31	265	7	−29	214	11	−30	285
9......	7	−14	260	7	−27	254	8	−28	276	9	−34	289
10......	7	− 9	256	8	−22	263	9	−19	269	9	−29	284
11......	7	− 7	256	8	−20	260	9	−18	276	8	−26	283
12......	6	− 3	258	8	−20	265	9	−11	285	7	−30	290

Hours.	May. s	May. α	May. β	June. s	June. α	June. β	July. s	July. α	July. β	August. s	August. α	August. β
		°			°			°			°	
12 a....	6	−31	278	7	−24	278	8	−25	272	8	−16	292
1	7	−36	281	8	−20	281	7	−28	335	8	−14	329
2......	7	−20	302	7	−15	282	8	−22	302	8	−13	321
3......	7	−19	302	8	−10	291	9	−18	317	10	−11	315
4......	9	−17	296	10	−12	288	9	−25	295	11	−12	300
5......	14	−16	284	16	−14	286	16	−20	290	15	−19	297
6......	22	−13	276	25	−11	275	23	−14	279	24	−18	280
7......	26	− 9	263	30	− 5	265	29	−10	265	31	−13	267
8......	28	− 4	256	30	0	252	31	− 6	251	32	− 9	226
9......	23	+ 7	235	26	+ 7	235	27	+ 5	233	27	− 1	227
10......	19	+34	198	22	+29	208	24	+20	208	21	+29	162
11......	24	+44	106	25	+36	139	25	+35	139	27	+31	128
12 p....	30	+33	97	31	+30	100	29	+30	105	37	+23	98
1......	35	+21	81	35	+23	81	34	+21	89	37	+16	88
2......	32	+13	73	34	+14	83	32	+14	83	32	+ 9	80
3......	23	+ 2	78	28	+ 1	81	26	+ 4	81	21	+ 2	75
4......	14	−15	81	19	−12	80	17	−10	78	11	−19	76
5......	10	−45	94	14	−36	87	10	−32	87	9	−46	86
6......	9	−51	112	9	−53	76	9	−50	111	1C	−51	63
7......	8	−48	166	9	−49	148	10	−38	96	10	−36	45
8......	8	−34	256	10	−46	320	9	−33	312	10	−27	314
9......	9	−31	294	9	−38	310	9	−30	299	9	−23	320
10......	8	−27	277	8	−33	304	9	−22	292	9	−23	296
11......	7	−28	282	8	−27	287	8	−27	277	10	−20	274
12......	6	−31	278	7	−24	278	8	−25	272	8	−16	292

Hours.	September. s	September. α	September. β	October. s	October. α	October. β	November. s	November. α	November. β	December. s	December. α	December. β
		°			°			°			°	
12 a....	9	−11	323	10	−10	272	9	+ 2	268	6	+40	252
1......	8	− 9	333	8	0	306	7	+ 6	225	7	+16	256
2......	10	− 6	322	7	+ 2	319	6	+23	286	3	+26	277
3......	10	− 7	317	8	− 1	313	5	+23	322	3	+28	316
4	12	− 9	320	8	+ 1	333	6	+16	331	4	+14	362
5......	13	−10	311	9	0	344	7	+17	365	6	+10	364
6	16	−12	300	10	− 7	341	10	− 4	347	7	+ 3	369
7......	22	−12	274	14	−16	310	10	− 6	353	9	+ 4	359
8.....	25	− 8	252	20	−15	274	10	−12	319	11	− 3	349
9......	25	+ 2	226	22	− 9	247	10	+14	281	9	+ 8	311
10......	21	+20	178	24	+15	214	12	+30	214	7	+22	238
11......	29	+27	135	24	+26	163	18	+25	174	11	+27	175
12 p....	35	+17	111	29	+24	107	22	+18	96	14	+18	121
1......	34	+13	92	32	+16	98	19	+10	94	14	0	111
12......	30	+ 1	82	26	+ 9	89	15	− 6	99	11	− 1	109
3......	18	−10	77	18	− 6	87	13	−20	115	8	−18	108
4......	10	−34	89	9	−34	110	11	−35	116	8	−20	133
5......	7	−41	159	8	−36	130	9	−30	142	6	−24	126
6......	7	−50	148	9	−42	156	8	−35	116	4	−24	128
7......	7	−43	168	8	−51	285	7	−36	195	4	−27	227
8......	9	−32	282	9	−36	272	9	−22	256	5	−19	243
9......	8	−26	286	11	−23	272	11	−19	259	6	−15	250
0......	9	−18	290	11	−20	278	11	−18	265	7	−10	248
1......	8	−13	308	11	−15	289	9	− 6	264	7	+ 8	254
2......	9	−11	323	10	−10	272	9	+ 2	268	6	+10	252

PROPOSED OBSERVATIONS IN METEOROLOGY TO BE UNDERTAKEN DURING THE EXPEDITION TO OBSERVE THE TOTAL ECLIPSE OF THE SUN IN SPAIN AND TUNIS, AUGUST 30, 1905.

By Prof. FRANK H. BIGELOW.

In response to the invitation of Rear-Admiral C. M. Chester, U. S. Navy, superintendent of the Naval Observatory, the Weather Bureau has undertaken to organize a series of meteorological observations in connection with the Eclipse Expedition sent by the Navy Department to observe the total eclipse of the sun on August 30, 1905. Since there is an uncertainty as to the outcome of the observations during totality, depending upon the prevailing weather conditions, several collateral lines of work have been planned, which are independent of that contingency. Prof. Frank H. Bigelow and Dr. Stanislav Hanzlik from the Weather Bureau, in cooperation with the officials of the Navy, will execute the program as far as practicable.

1. *Meteorological observations.*—It is proposed to establish three astronomical stations, one in Africa and two in Spain, and these will be equipped with the usual instruments for recording the pressure, temperature, humidity and vapor tension, wind direction, and velocity. In addition, each primary station will have two secondary stations arranged to form three belts across the track, so that there shall be one station near the center and one on each side of the track of totality, which is 120 miles in width.

2. *Shadow band observations.*—Suitable circular letters, in English and Spanish, with a track map of the eclipse from the Bay of Biscay to Egypt, have been prepared, giving instructions for the observations and forms for recording them. These will be distributed freely along the track to volunteer observers, who have been requested to return their reports to the American Legation in Madrid, Spain.

3. *Radiation observations.*—We have secured two types of radiation apparatus, (1) an Ångström pyrheliometer, and (2) an Abbot actinometer, which will be used in connection with a Pickering polarimeter for measuring the percentage or sky polarization. These instruments have been compared with the apparatus employed by Mr. H. H. Kimball, of the Weather Bureau, in his series of radiation observations now covering more than two years, and the eclipse records will be standardized by them. It is hoped that observations can be made with the globe actinometer on the sea voyage, as a connecting link between those made in the United States and Europe.

4. *Electrical observations.*—The instruments ordered from Günther and Tegetmeyer, Brunswick, Germany, for the Mount Weather Observatory, will be available for this expedition. There are four complete sets of apparatus for measuring the electric potential (Exner electroscope), four sets for counting the number of ions per cubic centimeter of air (Ebert aspiration apparatus), and four sets for measuring the coefficient of electrical dissipation (Elster and Geitel form). These will be used if suitable observers can be secured in the time at our disposal.

5. *Kite observations.*—A complete outfit of the Marvin kite and recording meteorographs will be installed on the U. S. S. *Cæser*, for use on the voyages from Norfolk to Gibraltar, and in the Mediterranean to Tunis, and return. An effort will be made to secure observations of the temperatures, pressure, humidity, wind direction, and velocity in this portion of the Atlantic Ocean. The outward voyage will take place during the first half of July and the return voyage in September.

The organization of so many lines of work will require suitable details of assistants from the ships of the American squadron under command of Rear-Admiral Chester, but as the officers are well adapted to take up these observations, it is believed that there will be no difficulty in executing an important part of the schedule as outlined in this paper.

FIG. 1—Track of the shadow of the total eclipse of the sun August 30, 1905.

SNOWFALLS, FRESHETS, AND THE WINTER FLOW OF STREAMS IN THE STATE OF NEW YORK.

By ROBERT E. HORTON, Hydrographer, U. S. Geological Survey. Dated Utica, N. Y., April 18, 1905.

In a region having a somewhat rigorous climate, as does New York, the conditions controlling stream flow in winter are greatly different from those pertaining to the summer months.

For summer periods, a knowledge of the depth and distribution of precipitation and of the temperature, wind, and relative humidity, the latter factors controlling evaporation losses, are sufficient to enable the run-off of streams during different years to be rationally compared and the main causes of their differences traced. Such data have been provided in the records of the U. S. Weather Bureau.

In order to reasonably analyze and compare the records of a stream for the winter periods of different years, much additional data are required which are not a matter of general record; for example—

(1) Dates between which the soil is frozen.
(2) Dates between which soil is snow covered.
(3) Successive depths of snow accumulations.
(4) Dates and general extent to which water surfaces within the watershed are frozen.
(5) A record of the depth and fluctuation of the level of the ground water horizon is also desirable in studying both winter and summer records.

Few systematic records of soil temperatures are kept in the winter. The date when frost permanently enters and leaves the ground can, however, be closely inferred from the air temperature records.

The water equivalent of loose freshly fallen snow is usually between one-seventh and one-twelfth. The difference in water equivalent between loose freshly fallen snow and compact accumulated snow should not be overlooked. The water equivalent of the layer of snow lying on the ground late in winter is very much greater than that of fresh fluffy snow; a fact which may be of some importance in predicting floods, although data on this point are surprisingly rare.

In the accompanying Table 1 the results of a valuable series of Prussian experiments are given. These are of practical interest from the fact that an attempt was made to separate the freshly fallen snow from the preceding accumulation. The average water equivalent for the total snow cover was found to be 15.26 per cent, and for the freshly fallen portion, 8.48 per cent. The snow cover came and went at frequent intervals, and in many instances the entire layer was freshly fallen. The total depth was usually but a few inches. The results probably represent with precision the water equivalent of a thin snow cover under the conditions described.

In Table 2 are given the results of experiments made in the New England States, chiefly in the years 1903 and 1904. In genéral, the water-snow ratios for different localities agree closely for the same dates.

The winter of 1903-4 was one of unusual and continued cold in New York and New England. The snowfall was very heavy and there was little rain and very few thawing days from December 1 to March 25.

In Table 3 are shown the results of a series of experiments made by the writer at Utica, N. Y., in the winter seasons of 1903-4 and 1904-5.

A level sodded plot in a city park was selected over which the snow was found by trial to lie quite uniformly. Large deciduous trees surround but do not overshadow the plot, near the center of which, and at successive points, a tin tube about three inches in diameter was thrust vertically downward and a cylinder of snow obtained, whose equivalent water depth was accurately determined by weight. A sample was taken each Monday to correspond with the weekly snow re-

TABLE 1.—*Water content of snow, Potsdam, Prussia, reduced to English units by Robert E. Horton.*[1]

Date.	Old snow cover.		Fresh snow cover.	
	Depth.	Water ratio.	Depth.	Water ratio.
(1)	(2)	(3)	(4)	(5)
1896.	*Inches.*		*Inches.*	
Jan. 1	3.54	0.17	0.75	0.08
Jan. 3	3.07	0.21	......	......
Jan. 5	0.87	0.35	......	......
Jan. 7	0.79	0.34	......	......
Jan. 8	1.14	......	0.16	0.18
Jan. 9	1.57	0.27	0.43	0.04
Jan. 10	2.76	......	0.83	0.06
Jan. 11	2.16	0.20	......	......
Jan. 12	1.57	......	0.79	0.07
Jan. 13	2.16	......	......	......
Jan. 16	2.79	0.16	1.22	0.18
Jan. 17	6.14	......	3.11	0.07
Jan. 18	5.12	0.21	......	......
Jan. 20	2.05	0.34	......	......
Jan. 22	1.77	0.26	......	......
Jan. 23	2.36	0.24	0.39	0.08
Jan. 26	3.15	......	1.57	0.07
Jan. 27	2.28	0.27	......	......
Jan. 29	3.19	......	0.16	0.08
Jan. 30	3.03	0.24	......	......
Feb. 15[2]	3.07	0.07	3.07	0.07
Feb. 16	2.13	0.10	......	......
Feb. 17	2.01	0.11	0.08	0.12
Feb. 18	1.50	0.16	......	......
Feb. 19	0.67	0.30	......	......
Feb. 28	0.28	0.03	0.28	0.03
Mar. 9[2]	0.79	0.12	0.79	0.12
Mar. 13[2]	0.08	0.31	0.08	0.31
Nov. 29[2]	0.20	0.10	0.20	0.10
Nov. 30	0.47	0.10	0.16	0.12
Dec. 16	1.18	0.07	1.18	0.07
Dec. 26	1.50	......	0.59	0.04
1897.				
Jan. 10[2]	0.315	0.08	0.315	0.08
Jan. 11	0.315	0.08	......	......
Jan. 12	0.197	0.16	......	......
Jan. 15	0.827	0.20	0.708	0.08
Jan. 16	1.496	0.12	0.551	0.03
Jan. 17	0.984	......	......	......
Jan. 22	0.0236	0.08	0.0236	0.08
Jan. 23	1.574	0.07	1.42	0.07
Jan. 24	3.740	......	3.15	0.11
Jan. 25	6.300	0.09	3.03	0.07
Jan. 26	6.850	......	1.30	0.07
Jan. 27	7.087	......	1.30	0.07
Jan. 28	9.645	0.12	2.36	0.08
Jan. 29	9.921	......	1.61	0.10
Jan. 30	9.606	0.14	0.906	0.07
Feb. 1	8.780	0.15	......	......
Feb. 3	8.858	......	1.22	0.18

Date.	Old snow cover.		Fresh snow cover.	
	Depth.	Water ratio.	Depth.	Water ratio.
(1)	(2)	(3)	(4)	(5)
1897.	*Inches.*		*Inches.*	
Feb. 4	8.267	0.18	......	......
Feb. 7	10.236	......	2.76	0.11
Feb. 8	11.811	0.18	3.86	0.14
Feb. 11	9.646	0.22	......	......
Feb. 15	7.874	0.25	......	......
Feb. 18	6.968	0.30	......	......
Feb. 22	3.150	0.32	......	......
Mar. 7[2]	0.197	0.10	0.197	0.10
Nov. 25[2]	0.512	......	0.512	......
Nov. 27	0.787	0.10	0.787	0.10
Dec. 4	1.417	0.06	1.417	0.06
Dec. 23	0.236	0.10	0.236	0.10
1898.				
Feb. 5[2]	0.984	0.11	0.984	0.11
Feb. 7	4.33	0.08	1.50	......
Feb. 10	2.59	0.20	0.79	0.09
Mar. 6[2]	1.30	0.13	1.30	0.13
Nov. 25[2]	0.394	0.16	0.39	0.16
1899.				
Jan. 2[2]	0.63	0.22	0.63	0.22
Jan. 3[2]	3.35	0.13	3.35	0.13
Feb. 2[2]	0.197	0.08	0.197	0.08
Feb. 3	1.54	0.03	1.50	......
Feb. 6	0.59	0.05	0.236	......
Mar. 20[2]	0.59	0.05	0.59	0.05
Mar. 23[2]	0.197	0.04	0.197	0.04
Mar. 27[2]	0.118	0.15	0.118	0.15
Dec. 11[2]	0.866	0.06	0.866	0.06
Dec. 14	3.540	0.09	0.906	0.05
Dec. 18	5.710	0.13	0.590	0.17
Dec. 25	6.100	0.14	0.906	0.06
Dec. 27	7.240	0.14	......	......
Dec. 31	3.740	......	......	......
1900.				
Jan. 1	2.16	0.195	......	......
Jan. 12[2]	0.67	0.03	0.67	0.03
Jan. 15	0.71	0.045	0.32	......
Jan. 18	1.22	0.113	0.16	0.125
Jan. 31[2]	9.50	0.064	0.65	0.091
Feb. 9	3.74	0.189	......	......
Feb. 12	7.68	0.152	0.28	0.075
Feb. 15	8.47	0.180	0.20	0.105
Feb. 19	6.30	0.250	......	......
Mar. 2[2]	0.12	......	0.12	......
Mar. 5	0.28	......	0.20	0.100
Mar. 19[2]	0.32	0.182	0.32	0.19
Mar. 23[2]	0.12	0.067	0.12	0.0067
Average	......	0.1526	......	0.0848

[1] Ergebnisse der Meteorologische Beobachtungen, Königl. Preuss. Meteorologische Institut, 1896-1900. Berlin.
[2] Old snow cover melted and new one formed since preceding record.

TABLE 2.—*Water equivalent of snow. Results of observations under the direction of N. C. Grover, made in New England during 1903-4. Compiled by H. K. Barrows, December, 1904.*

Date.	Depth of snow.	Water equivalent.	Ratio, water depth / snow depth.	Inches of snow per inch of water.	Locality
1900.	*Inches.*	*Inches.*			
March 17	38	10.49	0.276	3.62	Rumford Falls, Me.
March 31	20	9.84	0.492	2.03	Do.
1903.					
March 1	19	6.12	0.322	3.10	Do.
March 19	10	4.60	0.460	2.17	Madison, Me.
March —	10	8.00	0.800	1.25	Jackman, Me.
1904.					
January 29	15.75	2.35	0.149	6.71	Upper Dam, Me.
February 2	28	6.20	0.221	4.53	Jackman, Me.
February 3	24	5.12	0.213	4.69	Bartlett, N. H.[1]
February 4	20	4.16	0.208	4.81	The Forks, Me.
Do	16.5	3.25	0.197	5.08	Bretton Woods, N. H.
February 5	24	7.00	0.292	3.42	Danforth, Me.
Do	28	6.54	0.233	4.29	Oquossoc, Me.
February 6	22	6.70	0.305	3.28	North Woodstock, N. H.
February 7	27	4.03	0.149	6.71	Chesuncook, Me.[2]
February 8	20	5.20	0.260	3.85	Upper Dam, Me.
February 11	20	5.92	0.296	3.38	Roach River, Me.
February 26	32	4.83	0.151	6.62	Madison, Me.
February 29	18	4.33	0.240	4.17	The Forks, Me.
March 7	22	2.00	0.091	10.99	Bretton Woods, Me.
March 8	24	6.20	0.258	3.88	The Forks, Me.
Do	18	5.30	0.294	3.40	Do.
March 10	18	5.89	0.327	3.06	Bartlett, N. H.[3]
March 11	12	1.20	0.100	10.00	Chesuncook, Me.
Do	14	1.32	0.094	10.64	Do.
Do	16.5	1.44	0.087	11.49	Do.
April 18	10	4.30	0.430	2.32	Do.
April 20	9	3.54	0.394	2.54	The Forks, Me.
April 21	......	5.88	......	......	Roach River, Me.[4]

[1] Two inches of ice. [2] Light, frosty substance. [3] Snow, ice, and crust. [4] Grant farm. Depth of snow not given.

TABLE 3.—*Water equivalent of accumulated snow on ground at Utica, N. Y. Observed by Robert E. Horton.*

Date.	Depth of snow on ground.	Condition.	Equivalent water depth.	Ratio water depth / snow depth.	Inches snow per inch water.
1903.	*Inches.*		*Inches.*		
October 27	2.0				
November 15	T.				
December 9	18				
December 16	12.6		2.260	0.180	5.57
December 21	10.9		2.77	0.254	3.94
December 28	12.0		2.64	0.220	4.55
December 31	11.9		2.39	0.202	4.96
1904.					
January 2	13.0		2.39	0.184	5.44
January 5	19.0		3.52	0.186	5.39
January 11	13.0		3.56	0.274	3.65
January 19	19.0		3.65	0.192	5.20
January 25	21.0		5.28	0.251	3.98
February 1	21.5		4.92	0.229	4.37
February 8	18		6.165	0.342	2.92
February 15	22		6.42	0.292	3.42
February 22	20		6.67	0.333	3.00
February 29	22		6.04	0.275	3.64
March 2	21		6.04	0.287	3.48
March 7	18		7.42	0.413	2.42
March 11	15		4.52	0.301	3.32
March 14	13		4.67	0.260	2.78
March 21	14.5		5.92	0.408	2.45
March 25	5.5		1.65	0.300	3.33
1904.					
November 29	2.75	Dry, loose	0.25	0.09	11.11
December 5	1.0	....do	0.125	0.125	8.000
December 12	2.75	... do	0.25	0.09	11.11
December 19	4.5	....do	0.564	0.125	8.000
December 27	0.75	Ice	0.189	0.252	3.968
1905.					
January 3	5.0	Dry, light	0.628	0.126	7.936
January 9	6.75	....do	1.635	0.242	4.132
January 16	4	...do	1.131	0.283	3.533
January 23	2.25	Dry, ice bottom.	0.25	0.11	9.09
January 30	6	Dry	1.131	0.188	5.319
February 6	10	....do	2.389	0.238	4.201
February 13	19.25	Dry, settled	3.272	0.171	5.847
February 21	14.5	....do	3.272	0.226	4.424
February 28	12	....do	3.183	0.265	3.773
March 6	10.25	Damp	2.893	0.282	3.546

TABLE 4.—*Water equivalent of accumulated snow at Hancock, N. Y. D. B. Van Etten, Observer.*

Date.	Accumulated snow.	Water.	Ratio, water / snow.	Inches snow per inch water.
1905.	*Inches.*	*Inches.*		
January 2	•2.5	0.42	0.168	5.952
February 6	16	1.85	0.116	8.620
February 14	18	2.93	0.163	6.134
February 20	20	3.49	0.124	8.064
February 27	10	2.45	0.245	4.081
March 6	9	2.40	0.267	3.745
March 13	5	1.30	0.260	3.846
March 20	4	1.35	0.338	2.958

TABLE 5.—*Water equivalent of accumulated snow, at Graefenberg reservoir, near Utica, N. Y. R. O. Salisbury, Observer.*

Date.	Accumulated snow.	Water.	Ratio, water / snow.	Inches snow per inch water.
1904.	*Inches.*	*Inches.*		
December 1	3.5	0.24	0.069	14.49
December 5	3.75	0.35	0.093	10.75
December 12	6.0	0.70	0.117	8.547
December 19	9.0	1.14	0.123	8.130
December 26	4.5	0.81	0.18	5.555
1905.				
January 1	3.5	0.87	0.249	4.016
January 9	8.5	1.98	0.233	4.291
January 16	7.0	1.88	0.27	3.703
January 23	8.5	2.38	0.28	3.571
January 30	10.0	2.61	0.261	3.831
February 6	17.0	5.06	0.295	3.389
February 13	20.0	5.97	0.298	3.355
February 20	22.0	6.25	0.285	3.508
February 27	22.5	7.30	0.325	3.076
March 6	24	6.66	0.28	3.571
March 13	21.5	6.03	0.281	3.558
March 20	14.5	4.88	0.336	2.976
March 27	8.5	3.87	0.397	2.518

ports of the U. S. Weather Bureau, and the actual depth of snow was also measured.

These measurements show nearly a continuous increase in the water equivalent of a foot of accumulated snow as the season advanced, and in general, an increase in depth of the snow layer was accompanied by an increase in the water equivalent per unit depth.

The heavy snow accumulation lying on the ground in March, 1904, was found to consist of strata of snow of varying compactness, nearly always with a half inch or more of nearly solid ice at the bottom, which should not be omitted in measuring. Measurements taken immediately preceding and again following a moderate rain, showed that the total rainfall had been added to the snow. The depth of the layer settled considerably as a result of the rain, so that the measurement taken just afterward showed the maximum snow-water ratio.

Similar records obtained at two other stations in New York during the winter 1904–5, are given in Tables 4 and 5.

All records indicate that for the heavy and persistent snow accumulations occurring in New York and New England a progressive growth in the water equivalent per inch of snow on ground will usually take place as the season advances due to compacting by wind, rain and partial melting, and to the weight of the superincumbent mass on the lower layers.

The water equivalent of compacted snow accumulation is commonly between $\frac{1}{3}$ and $\frac{1}{5}$ or at least double that for freshly fallen snow. It is believed that the water-snow ratios determined in one locality will apply approximately to any other locality where the temperature, depth of snow cover, and length of time it has lain on the ground are about the same.

The depth of snow on the ground at the end of each week, for about twenty-five stations in New York, is given on the snow and ice charts of the U. S. Weather Bureau.

Utilizing the water-snow ratios for Utica, a map has been prepared showing by isohydral lines the depth of water stored on the ground December 31, 1903, throughout the State of New York, representing precipitation during the calendar year 1903, but which became available to feed the streams during 1904. See fig. 3.

A very large percentage of accumulated snow subsequently appears as run-off in the stream, and it will be seen at once that in this locality the difference in water held on the ground as accumulated snow at the beginning and ending of any year, may be several inches; an important disturbing element in any attempt to correlate precipitation and flow of streams by calendar years.

The estimated average depth of water stored on the ground surface in New York in the form of snow, December 31, 1903, was 2.15 inches. On December 31, 1904, a large portion of the State was bare, while there were from one to eight inches of loose, dry snow elsewhere. It appears that about two inches of precipitation was thus added to the available supply for streams during 1904. As this water nearly all appears as run-off, it would cause an increase of one and one-half or two inches, or five to ten per cent in the run-off for the calendar year 1904 in excess of the amount resulting from the contemporaneous precipitation.

The agreement between the weekly precipitation measured as melted snow and the increment of accumulated snow is not very close. This may be for the reason that an ordinary rain gage does not properly register snowfall, or because the accumulated snow was of necessity measured in a protected place, whereas rain gages are usually exposed in the open. At Graefenberg reservoir, for example, the accumulated snow is measured in an opening in a small grove, while the precipitation is measured in an adjoining open field fully exposed to the wind, where the ground is nearly always bare. In January, 1905, the snow accumulated in the grove increased 1.74 inches. The total precipitation was 1.76 inches. In February, 1905, the snow storage increased 4.69 inches in the grove while the measured precipitation was only 0.54 inch. In general, however, the total precipitation is in excess of the snow

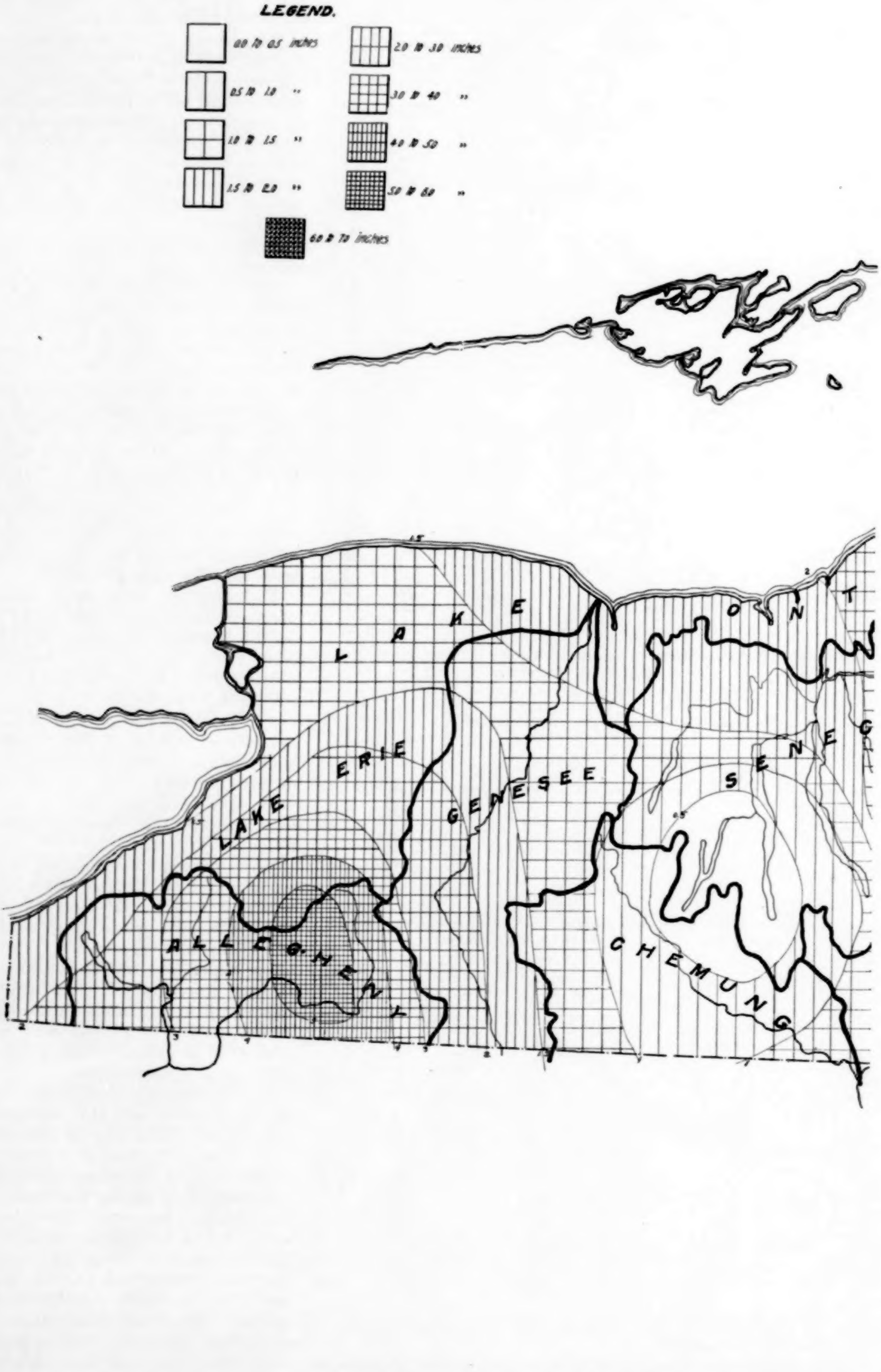
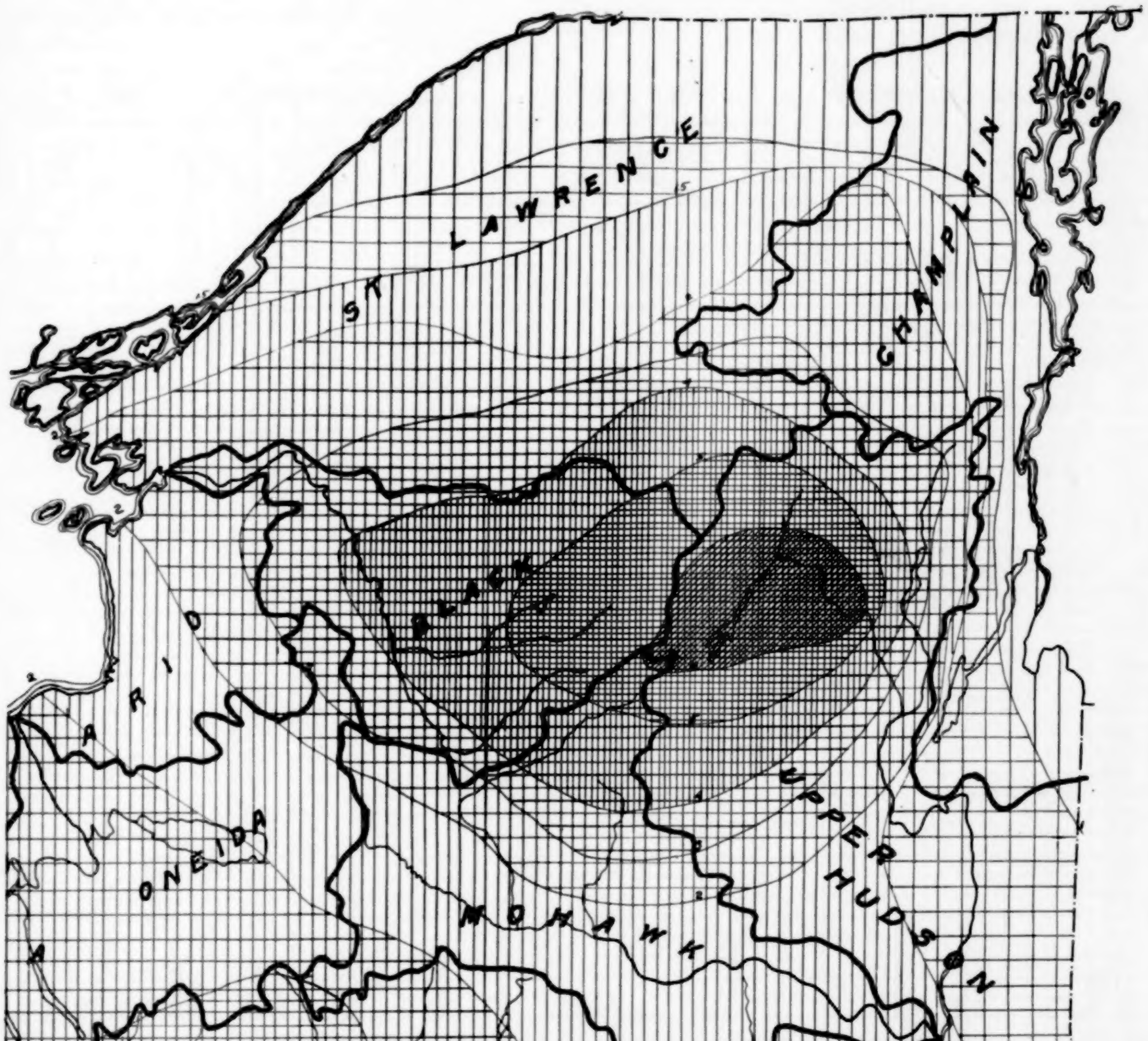


FIG. 1.—Water equivalent of snow on ground in New York, December



31, 1903. Contour lines bound areas of varying water depth in inches.

27——3

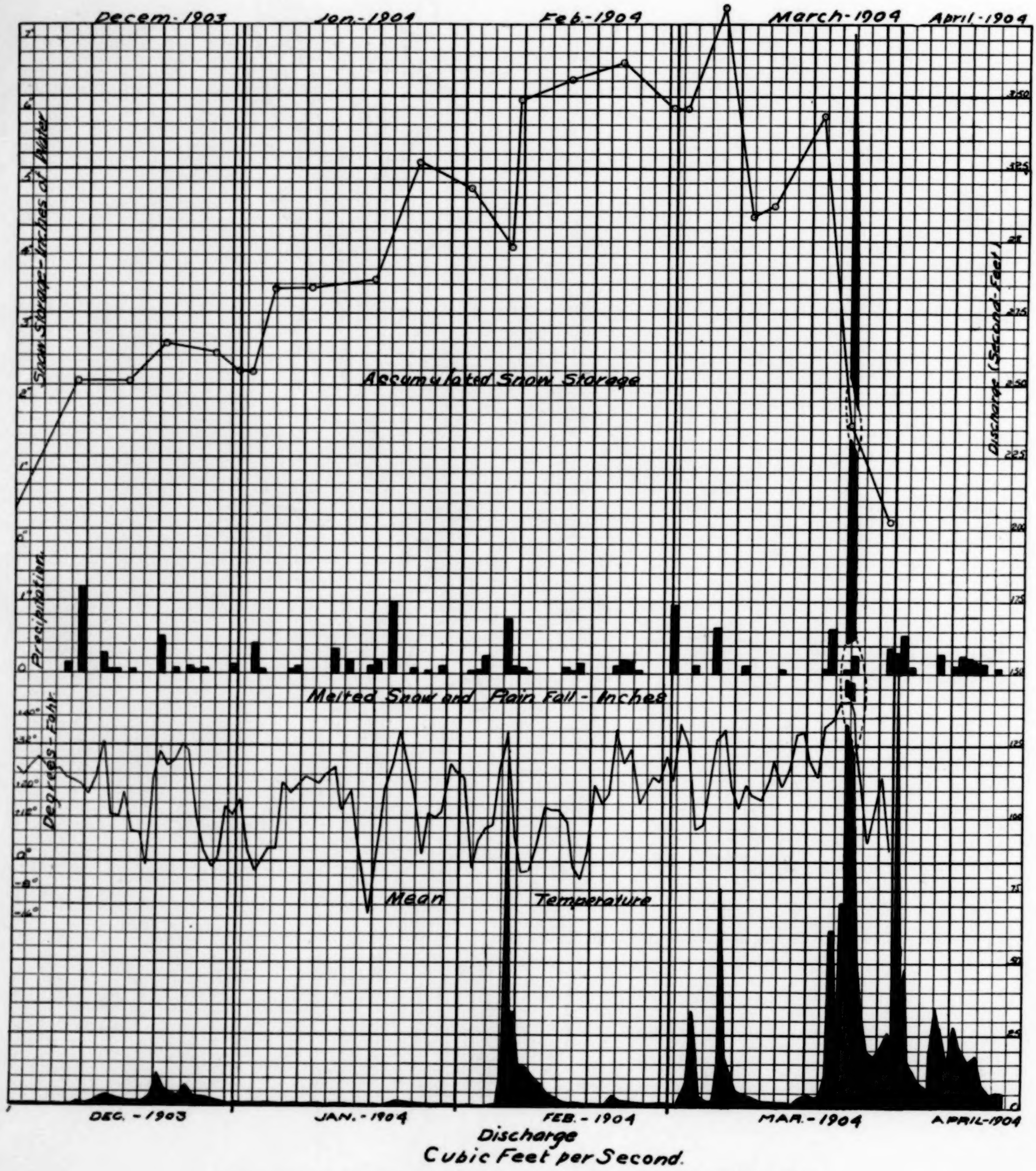


FIG. 2.—Winter meteorological conditions, Starch Factory Creek near Utica, N. Y.

storage, indicating a loss from the snow on ground through evaporation.

In conjunction with the meteorological records at Graefenberg reservoir, a weir was erected and a careful record kept of the flow of Starch Factory Creek. Referring to the diagram (fig. 2) it will be seen that during the period from December 1, 1903, to February 7, 1904, the temperature was almost constantly below 32°. There was no precipitation as rain, and it thawed but little. This being the case, the interesting conclusion arises that during this period of 69 days the entire supply to streams in this locality must have been from ground water, or lake or marsh storage, or from these sources combined.

There is no lake or marsh storage in this catchment basin. The snow cover in a very close winter season effectually cuts off all surface run-off into streams. Such a period affords therefore, in a basin without lakes or marshes, a ready means of determining the inflow to the stream from ground water. With this end in view, a record of the ground-water level in wells is also kept.

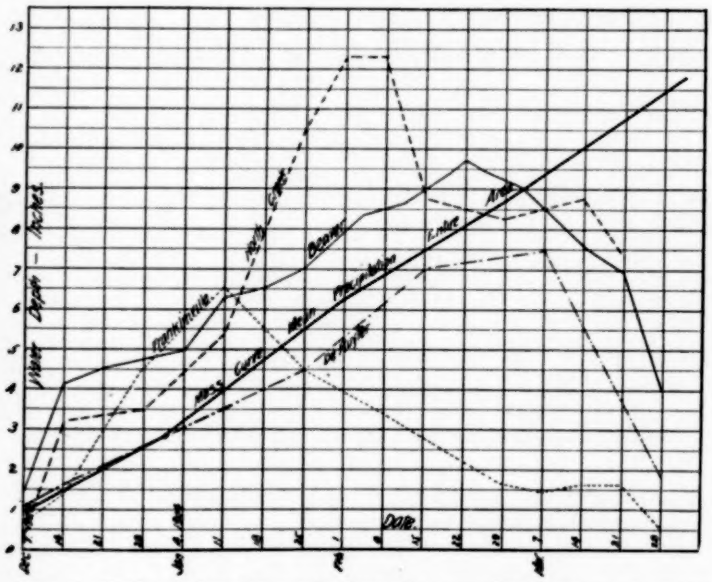


FIG. 3—Estimated water equivalent of accumulated snow on ground at points in New York State, winter of 1903–4.

The method of studying ground water is outside the scope of this paper. It may be mentioned in passing, however, that the winter season of 1903–4, occasioned the lowest known volume of flow in many New England streams; the cause, as above outlined, being the shutting off of the surface inflow from lakes and precipitation.

Fig. 2 clearly shows that the stream flow did not respond even to heavy precipitation (snowfall) at any time covered by the diagram, unless the temperature was above 32°. It appears that the winter flow of such a stream is much more nearly a function of the temperature than of the precipitation. The lack of direct relation between precipitation and run-off during the spring freshet season is even more marked, confirming the proposition that during the season of snow storage there is no direct relation between monthly precipitation and contemporaneous stream flow, inasmuch as water may be carried forward from the earliest snowfall to the spring freshet, in the form of surface storage. As a rule, any rise of temperature above 32° is accompanied by rise of the stream and by a diminution of the snow storage.

The lack of direct relation between precipitation and run-off during the winter season is further illustrated by the data given in Table 6, prepared from gagings under the writer's direction. The figures show the percentage relation between run-off of each month and the actual precipitation for the same month during the severe and snowy winter of 1903–4. Only a few cases are given out of a much larger number of observations.

On West Canada Creek area a precipitation of 10.61 inches in December, 1903, was accompanied by a run-off of 1.31 inches, or 12.35 per cent. In April, 1905, the same stream yielded 12.26 inches run-off, the contemporaneous precipitation being 3.72 inches, or less than one-third the run-off. The run-off continued in excess of the contemporaneous precipitation during two, three, or four months in the spring of 1903–4. In seasons of less snowfall the duration of the season of excess of run-off over precipitation is shorter, but the run-off invariably exceeds the rainfall during one or two spring months. This is illustrated by Table 7 giving the monthly precipitation and run-off of Mohawk River at Little Falls, N. Y., during several winter periods.

TABLE 6.—*Comparison of winter precipitation and run-off, winter of 1903–4.*

Stream.	Location.	Drainage area.	Method of gaging.	Character of basin.
		Sq. m.		
West Canada Creek.	Twin Rock, N. Y.	364	Current meter	Rugged, wooded.
East Canada Creek.	Dolgeville, N. Y.	256	Dam and mill	Rugged, semicleared
Saranac River.	Plattsburg, N. Y.	624	Dam and mill	Wooded, many lakes.
Reel's Creek.	Utica, N. Y.	44	Weir.	Precipitous, sodded, no lakes.
Chenango River.	Binghamton, N. Y.	1534	Current meter	Rolling, mostly cleared, no lakes.
Susquehanna River..	Binghamton, N. Y.	2400	Current meter.	Rolling, mostly cleared, few lakes.
Catskill Creek.	South Cairo, N. Y.	263	Current meter.	Precipitous, rocky, mostly wooded.
Oneida River.	Scrœppels Bridge, N. Y.	1313	Current meter	Flat, large lake area.

TABLE 6, CONT'D.—*Percentage of rainfall appearing in stream as run-off.*

Month.	West Canada Creek.	East Canada Creek.	Saranac River.	Reel's Creek.	Chenango River.	Susquehanna River.	Catskill Creek.	Oneida River.
December, 1903	12.35	73.2	39.2	29.1	43.6	115.	53.	47
January, 1904..	29.47	38.0	34.1	19	61.4	84	98	40
February, 1904.	36.34	35.0	54.1	25	183.6	207	228	102
March, 1904....	162.1	82.7	243.7	296	281	162	197	166
April, 1904.....	329.6	255.	113.2	298	152	173	97	224
May, 1904......	189.2	154.3	116.2	48.7	50.7	60.7	44.5	165

TABLE 7.—*Comparison of winter precipitation and run-off, Mohawk River at Little Falls, N. Y. Drainage area, 1306 square miles. Depths are in inches for the whole catchment area.*

Months.	1898–9.		1899–1900.		1900–1901.		1901–2.		1902–3.		1903–4.	
	Precipitation.	Run-off.	Precipitation.	Run-off.	Precipitation.	Run-off.	Precipitation.	Run-off.	Precipitation.	Run-off.	Precipitation.	Run-off.
November...	4.72	2.46	2.84	1.45	6.96	3.30	4.42	1.38	2.31	2.21	2.63	1.46
December...	4.20	1.74	4.09	2.69	3.48	2.85	4.91	3.47	4.38	2.95	4.52	1.32
January.....	2.83	2.35	4.02	4.86	3.09	1.53	1.50	1.27	3.47	1.90	4.16	1.20
February....	2.56	1.19	3.93	5.08	2.37	0.89	4.08	0.94	3.08	2.87	2.91	1.88
March.......	5.27	3.32	6.12	2.18	3.15	4.02	4.22	8.34	5.88	9.54	3.21	5.07
April........	2.03	6.92	1.49	6.95	3.13	6.06	3.04	3.00	2.13	3.56	3.28	7.01
May.........	3.77	2.34	2.24	1.82	5.16	2.53	3.88	2.33	0.15	0.67	3.74	3.36

During the winter season, when the soil surface is frozen and covered with snow, the flow in streams is comparatively steady. The wide variations appearing in the percentages of Table 6 for the months of December, January, and February are chiefly due to the varying precipitation during the different months.

There are a number of considerations in addition to snow storage which may tend to increase the apparent rainfall run-off ratio during the winter season.

(1) The stream gagings may be in excess, due to the accumulation of ice on dams or in streams, causing backwater. This is not true in the cases observed in April and May, and it is believed it does not materially affect any of the results here given.

It will be noted that gagings made by different methods, weirs, dams, mills, and by current meter, all lead to the same result, namely, the measured run-off during the winter season nearly equals and sometimes for several months exceeds the measured precipitation at nearby stations.

(2) The ground-water level is nearly always drawn down considerably in the course of a long, cold winter; hence, there should be added to the possible supply to the stream from direct precipitation the amount drawn from ground-water storage during the winter. In the case of areas like those listed in Table 6 it is not very large, probably not more than one or two inches, as a maximum.

(3) Regarding the measurement of winter precipitation, the U. S. Weather Bureau stations are mostly located in the valleys and at other than the highest elevations. The measured precipitation, even if correctly determined at these stations, would probably be somewhat deficient, as precipitation increases with altitude in many localities.

(4) The measurement of snowfall by catching it in a rain gage, in the same manner as rain, is likely to give deficient results inasmuch as the rain gage offers an obstruction and deflects the air currents. The snowflakes, owing to their small specific gravity, as compared with raindrops, do not enter the mouth of the gage, but are diverted to the side or carried over by the wind. This source of error is aggravated by the fact that nearly all the U. S. Weather Bureau rain gages are at considerable distances above ground and mostly in very open locations fully exposed to the wind.[1]

(5) As to distribution of snowfall, even though the snowfall were correctly measured at the points where the U. S. Weather Bureau stations are located, it can easily be seen that the results might not represent correctly the average snowfall even in the immediate locality. This was graphically illustrated at a rain-gage station in the Mohawk Valley last winter. The gage in question was located in the open, surrounded by cultivated fields. With some precaution the depth of snow which actually fell in the immediate vicinity of the gage was determined with fair accuracy. At no time in winter did the snow on the ground near the gage accumulate to a depth exceeding about one foot. The adjacent country comprises deep valleys occupied by streams, patches of woodland, and also clearings similar to that containing the gage. In the woodland and valleys within one-fourth mile of the rain gage, snow accumulated to a depth of three or four feet; thus it will be seen that the snowfall measured in the clearing, under conditions similar to those existing at many U. S. Weather Bureau stations, would represent very much less than the average of the entire region, including the woodland, valleys, and clearing, although it might be quite accurate as regards the snow that fell on the clearing itself.

With regard to the question whether the existing rainfall stations truly represent the average precipitation on the drainage basins, it may be said that the summer season rainfall-run-off ratios for these streams conform closely to existing notions, and it appears that the effect of this error, if any, is greatly exceeded by the other conditions described.

[1] For a number of years past the Weather Bureau has entirely disregarded gage measurements of snowfall whenever there was reason to believe that the gage was not collecting the full amount of fall. At such times measurements are made in some level place where it is apparent that an average depth can be obtained.—*H. C. F.*

The maximum flood discharge on northern streams may result chiefly from melting snow, accompanied by more or less rainfall.

TABLE 8.—*Melting-snow freshet, March, 1904; yield of small catchment areas near Utica, N. Y.*

Stream.	Drainage area, square miles.	Duration of freshet.			Average discharge in cubic feet per square mile per second.	Total yield during freshet. Depth run-off.
		From —	To —	Days.		
						Inches.
Starch Factory Creek	3.40	March 22,	March 29,	7	33.33	8.67
Reels Creek	4.42	March 24, noon,	March 29, noon.	5	29.92	5.56
Sylvan Glen Creek	1.18	March 22, noon,	March 27, noon.	5	19.06	3.55

Table 8 shows the run-off of Mohawk River and a number of its tributaries in March, 1904, during the melting-snow freshet. None of these streams have lake storage. The contemporaneous rainfall is shown in Table 9.

TABLE 9.—*Precipitation during spring flood, 1904, upper Mohawk River catchment area.*

Date.	Little Falls.	Savage reservoir.	Deerfield reservoir.	Rome.
March 21				0.20
March 22		0.07	0.72	0.30
March 23	0.71	0.61		
March 24				
March 25	0.35	0.05		0.20
March 26	0.18	0.23	0.45	0.33
March 27				
March 28				
March 29				
March 30				
March 31	0.08	0.35	0.45	0.15

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R. A. Edwards, Acting Librarian.

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THE RAINFALL OF THE DRAINAGE AREA OF NEW ORLEANS, LA.

By F. S. SHIELDS, Secretary of the Drainage Commission. Dated New Orleans, La., January 31, 1905.

I beg to transmit copy of the record of precipitation at the various rain-gage stations connected with the Drainage Department of the Sewerage and Water Board of the city of New Orleans, La.

I trust this record will be of some service, as the records are very carefully kept by means of up-to-date gages and by careful compilation of the information obtained therefrom. We conceive that this record is more comprehensive for the entire city than that of any one station, due to the fact that the increase in area covered by the various gages gives a more accurate basis on which to make calculations.

As the seasonal meteorological conditions during the past few years have shown great variations (the total rainfall of 36.62 inches in 1899, 64.1 inches in 1900, 37.93 inches in 1902, and again 50.71 inches in 1903), the tables should be of great interest to those who take note of such matters.

The Drainage Commission, from the date of its inauguration, established six rain gages, one at the Dublin Station, back of Carrollton, another at Audubon Park, one known as the "Jefferson," on Napoleon avenue, another at City Hall, another in Algiers, and another at London avenue, in the lower portion of the city. Daily reports are received from these rain gages, from which Table 1 is compiled. The locations of these gages are shown on the accompanying chart, fig. 1, by small black square dots and distances from the

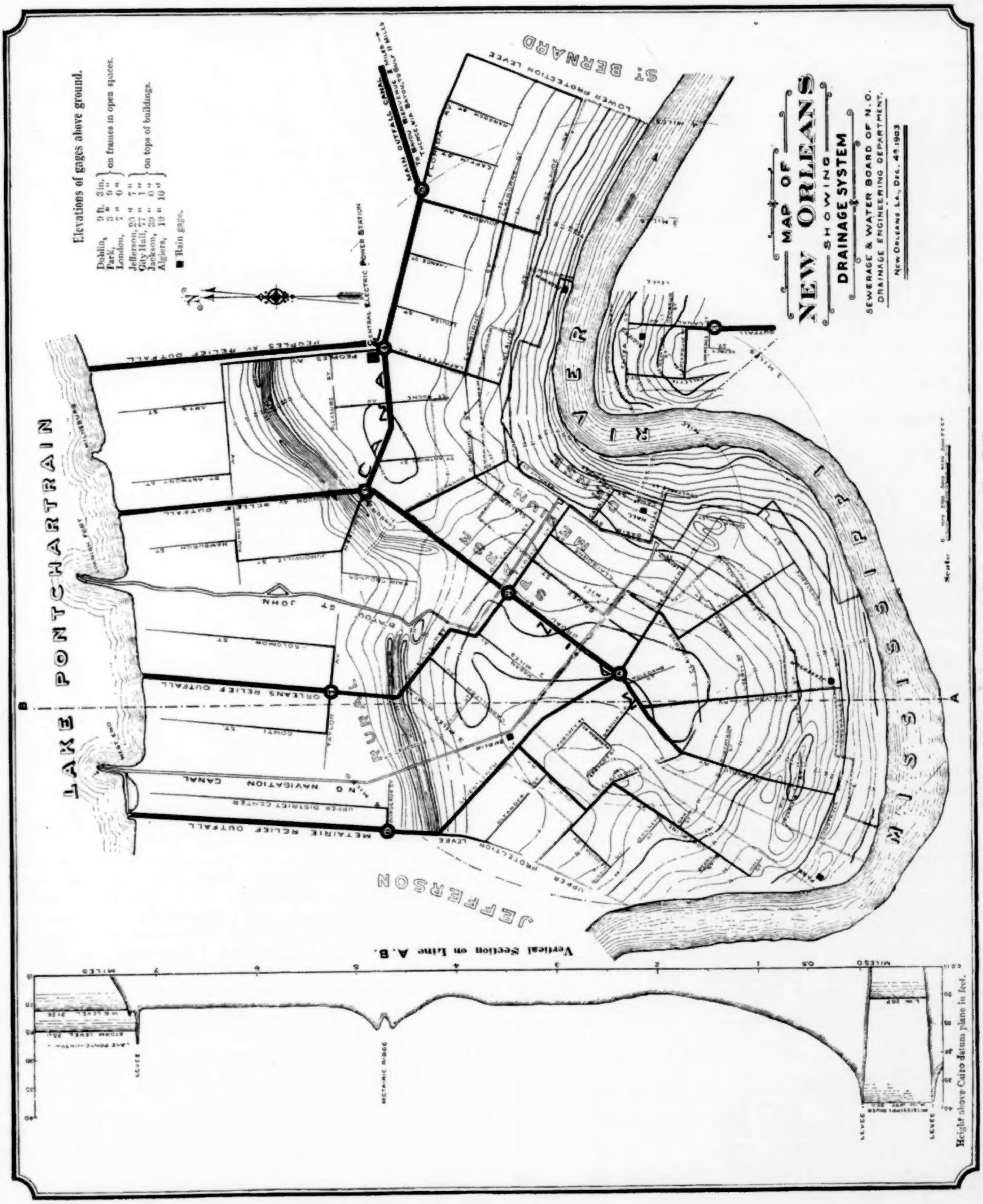

FIG. 1.—Location and distance from City Hall.

City Hall are shown by heavy black circles. As shown in Table 2, the average of these six stations gives the authentic rainfall of each month for the city.

Table 1.—1895.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	7.83	7.90	7.29	7.56	7.08	8.22
February	4.71	4.71	4.22	4.35	4.75	4.73
March	3.78	3.78	3.51	3.47	3.64	3.65
April	2.75	2.56	1.97	2.46	2.68	2.45
May	9.83	11.77	11.62	9.04	9.47	10.52
June	12.14	11.40	12.33	8.35	8.04	7.68
July	6.78	6.88	8.08	7.24	6.67	6.14
August	6.07	6.35	7.31	5.73	8.96	8.25
September	1.97	2.82	2.52	1.96	2.15	1.53
October	1.29	1.42	1.21	1.22	1.53	1.23
November	0.50	1.25	0.69	0.74	1.07	0.90
December	5.25	5.47	4.84	4.49	4.28	4.44

1896.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	2.44	2.68	2.68	2.64	2.15	2.51
February	3.23	2.93	3.02	2.82	3.49	2.95
March	4.38	5.77	6.61	5.24	5.60	4.06
April	2.41	2.51	3.20	4.65	3.26	3.48
May	2.89	1.55	2.91	2.54	2.40	6.37
June	7.22	10.43	8.12	9.01	12.13	10.28
July	3.17	4.33	4.20	3.29	3.13	3.25
August	5.00	3.17	4.04	3.32	3.72	5.02
September	7.30	4.20	5.62	5.38	5.21	7.11
October	6.08	6.76	6.43	5.89	7.17	7.78
November	3.66	4.33	4.05	2.98	3.07	4.33
December	3.82	3.65	3.49	3.70	3.03	4.04

1897.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	2.35	2.50	2.24	1.07	1.66	2.43
February	5.06	5.67	4.86	4.94	4.84	5.20
March	5.81	6.04	5.42	5.25	4.74	5.03
April	5.06	5.46	5.31	6.03	5.88	5.66
May	0.95	1.02	0.72	0.22	0.20	0.36
June	6.85	7.56	5.95	5.17	4.63	7.12
July	6.53	2.88	5.85	5.51	3.03	6.62
August	4.41	3.36	2.72	2.80	2.73	5.31
September	4.45	3.45	2.75	3.73	*5.09	3.64
October	4.24	3.67	3.60	3.36	3.47	4.25
November	3.28	3.04	3.01	3.76	3.22	3.01
December	5.55	5.36	5.31	4.82	4.18	5.30

1898.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	2.18	2.24	2.01	1.91	1.50	2.06
February	8.42	8.40	7.01	6.70	5.98	7.27
March	1.20	1.56	1.50	1.01	0.78	1.35
April	3.20	3.50	3.46	3.04	3.10	2.93
May	0.00	0.02	0.17	0.00	0.28	0.65
June	5.09	4.32	3.00	4.52	2.33	2.11
July	7.60	5.89	7.09	4.67	2.97	5.98
August	5.50	7.13	5.92	5.79	3.09	5.39
September	15.88	18.16	16.40	16.73	11.94	16.97
October	1.65	1.93	1.98	1.21	1.17	1.09
November	6.70	7.14	6.80	6.03	4.71	6.56
December	2.92	3.40	3.43	2.96	2.50	3.05

1899.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	2.36	2.68	3.03	2.78	2.17	2.65
February	3.88	3.92	3.83	3.53	1.50	3.90
March	3.06	3.08	2.88	3.00	2.10	3.24
April	1.93	1.90	1.30	1.75	1.46	1.96
May	0.09	0.05	0.54	0.20	0.00	0.02
June	11.12	12.40	9.85	8.50	4.57	11.31
July	6.46	6.94	5.62	5.46	2.49	7.25
August	3.26	1.94	3.32	2.42	*2.64	4.46
September	0.29	0.32	0.49	0.36	*0.44	0.44
October	1.67	1.84	1.44	0.99	*1.48	3.05
November	2.31	2.25	2.10	1.79	*1.85	1.79
December	3.15	4.00	3.74	3.17	*3.56	2.96

* Algiers from August 1.

1900.

Months.	Dublin.	Park.	Jefferson.	Hall.	Jackson.	London.
January	3.58	3.58	3.78	3.81	4.48	4.05
February	6.04	6.27	6.17	5.54	6.11	5.83
March	5.11	4.92	3.87	4.20	4.47	4.42
April	13.23	12.96	11.69	11.06	12.50	12.23
May	3.62	3.97	3.38	3.07	3.23	3.00
June	7.30	7.33	6.32	5.54	7.41	6.80
July	9.92	8.21	9.22	6.79	7.78	8.61
August	6.69	5.00	4.23	4.63	4.71	4.62
September	2.33	3.84	3.32	3.49	4.80	4.01
October	1.99	1.96	2.27	2.81	3.66	2.52
November	[illegible]	1.63	1.12	0.98	0.92	1.41
December	6.09	6.77	7.36	6.07	6.22	6.16

1901.

Months.	Dublin.	Park.	Jefferson.	Hall.	Algiers.	London.
January	3.06	3.83	3.33	3.06	3.30	3.39
February	5.45	5.84	6.49	5.13	5.90	5.52
March	4.40	3.41	3.17	3.52	4.17	4.17
April	8.63	8.43	7.37	6.95	6.98	8.13
May	2.69	1.06	0.47	0.80	1.32	4.44
June	2.81	3.14	3.60	3.80	5.09	2.94
July	9.20	8.74	9.15	8.73	10.43	10.28
August	3.47	6.84	4.24	4.88	5.53	5.01
September	3.48	3.96	3.24	3.36	2.57	2.80
October	3.63	2.83	3.29	3.0"	3.39	3.31
November	3.16	2.66	2.11	2.19	2.36	2.72
December	4.60	4.91	4.00	3.99	4.90	4.83

1902.

Months.	Dublin.	Park.	Jefferson.	Hall.	Algiers.	London.
January	0.41	0.76	1.06	0.85	0.71	0.68
February	3.37	3.47	3.92	3.32	3.59	3.44
March	4.30	4.16	4.07	3.53	3.13	4.13
April	3.25	3.57	3.48	3.43	3.38	3.37
May	2.23	1.35	1.54	1.63	1.53	3.98
June	1.56	1.26	1.31	1.45	1.30	0.37
July	1.91	1.75	2.65	3.69	2.56	2.50
August	4.65	3.24	3.75	2.84	2.43	2.34
September	6.94	6.12	5.28	6.12	4.50	6.65
October	2.73	2.60	1.87	1.83	2.68	2.54
November	3.43	3.33	3.21	3.23	3.39	2.89
December	5.40	6.52	6.19	5.12	5.78	5.94

1903.

Months.	Dublin.	Park.	Jefferson.	Hall.	Algiers.	London.
January	3.95	4.20	4.09	3.70	4.12	3.60
February	10.44	10.33	9.44	9.21	9.45	10.02
March	14.73	8.96	7.90	12.59	12.76	13.68
April	0.45	0.82	0.79	0.88	0.64	0.38
May	1.19	1.87	1.76	1.05	1.04	1.35
June	3.40	4.51	3.95	3.60	4.43	3.77
July	5.23	5.09	5.98	6.08	7.97	9.05
August	9.19	5.83	4.92	7.23	4.32	3.24
September	4.01	1.23	2.11	2.92	2.31	2.27
October	0.42	0.38	0.43	0.91	0.98	0.47
November	0.29	0.24	0.15	0.12	0.28	0.17
December	3.79	3.90	3.61	3.10	3.14	3.96

1904.

Months.	Dublin.	Park.	Jefferson.	Hall.	Algiers.	London.
January	2.77	3.21	3.29	3.10	3.65	2.88
February	1.52	1.46	1.63	1.40	1.86	1.68
March	4.09	4.77	4.84	3.72	3.49	3.32
April	2.05	2.18	1.61	1.73	1.61	1.42
May	4.12	3.17	3.09	4.05	4.07	4.45
June	3.75	3.57	3.38	4.61	4.18	3.70
July	5.59	6.36	5.54	6.65	8.61	6.85
August	6.18	5.72	5.72	4.34	6.29	5.18
September	4.31	3.21	2.59	2.93	4.24	3.14
October	0.82	0.54	1.76	1.20	1.42	1.11
November	1.67	1.47	1.43	1.50	1.77	1.76
December	2.63	3.00	2.34	2.08	2.32	2.53

1905.

Months.	Dublin.	Park.	Jefferson.	Hall.	Algiers.	London.
January	7.37	6.38	6.37	5.73	5.77	6.65
February	4.35	5.25	4.85	4.72	5.09	6.01
March	7.95	7.48	6.59	6.84	7.00	6.93

Table 2 for December shows the total rainfall at each station and the average at all stations, with a mean total for the twelve months, and a comparative showing of the rainfall for December for four years, back to 1900, inclusive. It also gives a comparison of the average total for the past twelve months, 1904, with the average rainfall of the same period for the past ten years.

Table 2.—*Record of precipitation at various stations, for month ending at midnight, December 31, 1904.*

Date.	Dublin.	Park.	Jefferson.	Hall.	Algiers	London.
1	0.18	0.20	0.21	0.19	0.22	0.25
2	0.38	0.41	0.49	0.31	0.37	0.21
3	0.02	0.01	0.01	0.01	0.01	.....
4	0.42	0.45	0.44	0.45	0.45	41
6	.....	0.01	.....	.....	.....	.....
9	0.25	0.23	0.15	0.18	0.19	0.31
14	0.07	0.12	0.12	0.04	0.05	0.13
16	0.23	0.19	0.13	0.13	0.13	0.20
25	0.03	0.03	0.03	0.02	.....	0.04
26	.....	.....	.....	0.01	.....	.....
27	1.05	1.35	0.76	0.74	0.90	0.98
Totals	2.63	3.00	2.34	2.08	2.32	2.53

TABLE 3.—*Record of rainfall in New Orleans, La., since establishment of drainage rain gages in 1894.*

Year and average up to date.	January. Amount.	February. Amount.	February. Total to date.	March. Amount.	March. Total to date.	April. Amount.	April. Total to date.	May. Amount.	May. Total to date.	June. Amount.	June. Total to date.	July. Amount.	July. Total to date.	August. Amount.	August. Total to date.	September. Amount.	September. Total to date.	October. Amount.	October. Total to date.	November. Amount.	November. Total to date.	December. Amount.	December. Total to date.	Annual monthly average.	Year.	Departure from 10-years average—51.55.
1894	2.11	13.27	15.38	4.48	19.86	4.27	24.13	2.36	26.49	4.10	30.59	8.15	38.74	7.46	46.20	1.37	47.57	0.76	48.33	1.19	49.52	1.94	51.46	4.29	1894	— 0.09
1895	7.65	3.76	11.41	3.63	15.04	2.48	17.52	10.38	27.90	10 48	38.38	6.97	45.35	7.32	52.67	2.16	54.83	1.32	56.15	0.88	57.03	4.80	61.83	5.15	1895	+10.28
Aver...	4.88	8.52	13.40	4.05	17.45	3.37	20.82	6.37	27.19	7.29	34.48	7.56	42.04	7.39	49.43	1.77	51.20	1.01	52.24	1.04	58.28	3.37	56.65			
1896	2.52	3.07	5.59	5.27	10.86	3.25	14.11	3.11	17.22	9.61	26.83	3.56	30.39	4.05	34.44	5.80	40.24	6.69	46.93	3.73	50.66	3.59	54.25	4.32	1896	+ 2.70
Aver...	4.09	6.70	10.79	4.46	15.25	3.34	18.59	5.28	23.87	8.06	31.93	6.23	38.16	6.27	44.44	3.11	47.55	2.92	50.47	1.93	52.40	3.44	55.84			
1897	2.02	5.10	7.12	5.38	12.50	5.57	18.07	0.58	18.65	6.21	24.86	4.90	29.76	3.56	33.32	3.85	37.17	3.76	40.93	3.22	44.15	5.09	49.24	4.10	1897	— 2.31
Aver...	3.57	6.30	9.87	4.69	14.56	3.90	18.46	4.11	22.57	7.60	30.17	5.89	36.06	5.59	41.65	3.30	44.95	3.14	48.09	2.25	50.34	3.85	54.19			
1898	2.00	7.30	9.30	1.23	10.53	3.20	13.73	0.10	13.83	3.56	17.39	5.70	23.09	5.48	28.57	16.01	44.58	1.50	46.08	6.32	52.40	3.06	55.46	4.62	1898	+ 3.91
Aver...	3.26	6.50	9.76	4.00	13.76	3.75	17.51	3.31	20.82	6.79	27.61	5.86	33.47	5.57	39.04	5.84	44.88	2.81	47.69	3.06	50.75	3.70	54.45			
1899	2.61	3.43	6.04	2.89	8.93	1.68	10.61	0.15	10.76	9.62	20.38	5.70	26.08	3.01	29.09	0.39	29.48	1.69	31.17	2.02	33.19	3.43	36.62	3.05	1899	—14.93
Aver...	3.15	5.99	9.14	3.81	12.95	3.40	16.35	2.78	19.13	7.27	26.40	5.83	32.23	5.16	37.39	4.93	42.32	2.62	44.94	2.89	47.83	3.65	51.48			
1900	3.88	5.99	9.87	4.50	14.37	12.29	26.66	3.38	30.04	6.78	36.82	8.42	45.24	4.98	50.22	3.63	53.85	2.53	56.38	1.28	57.66	6.44	64.10	5.34	1900	+12.55
Aver...	3.25	5.99	9.24	3.91	13.15	4.68	17.83	2.87	20.70	7.19	27.89	6.20	34.09	5.12	39.21	4.74	43.95	2.61	46.56	2.66	49.22	4.05	53.27			
1901	3.33	5.72	9.05	3.81	12.86	7.75	20.61	1.79	22.40	3.56	25.96	9.42	35.38	4.99	40.37	3.24	43.61	3.25	46.86	2.53	49.39	4.54	53.93	4.50	1901	+ 2.38
Aver...	3.26	5.95	9.21	3.90	13.12	5.06	18.17	2.73	20.90	6.74	27.64	6.61	34.25	5.10	39.35	4.56	43.91	2.69	46.60	2.64	49.24	4.12	53.36			
1902	0.75	3.52	4.27	3.89	8.16	3.41	11.57	2.04	13.61	1.21	14.82	2.51	17.33	3.21	20.54	5.93	26.47	2.38	28.85	3.25	32.10	5.83	37.93	3.16	1902	—13.62
Aver...	2.98	5.70	8.68	3.90	12.58	4.88	17.46	2.65	20.11	6.12	26.23	6.15	32.38	4.89	37.27	4.71	41.98	2.65	44.63	2.72	47.35	4.30	51.65			
1903	3.94	9.81	13.75	11.77	25.52	0.66	26.18	1.37	27.55	3.94	31.49	6.57	38.06	5.79	43.85	2.47	46.32	0.60	46.92	0.21	47.13	3.58	50.71	4.22	1903	— 0.84
Aver...	3.08	6.10	9.18	4.68	13.86	4.45	18.32	2.53	20.85	5.90	26.75	6.19	32.94	4.98	37.92	4.49	42.41	2.45	44.86	2.46	47.32	4.23	51.55			
1904	3.15	1.59	4.74	4.04	8.78	1.77	10.55	3.83	14.38	3.87	18.25	6.60	24.85	5.57	30.42	3.40	33.82	1.14	34.96	1.60	36.56	2.48	39.04	3.25	1904	—12.51
Aver...	3.09	5.69	8.78	4.63	13.40	4.21	17.61	2.64	20.26	5.72	25.98	6.23	32.21	5.04	37.25	4.39	41.64	2.33	43.96	2.38	46.34	4.07	50.41			

TABLE 2.—*Record of precipitation at various stations*—Continued.

Average of all stations (6) for month of December, 1904........... 2.48
Average of all stations east of river (5) for month of Dec. 1904.... 2.52
Monthly average of all stations for 1904, 12 months............... 3.25

Average of all stations for the month of December, as compared with averages of past four years.			Average of all stations for the year 1904, as compared with averages of past four years.		
1904	2.48	0.00	1904	39.05	0.00
1903	3.58	— 1.10	1903	50.71	— 11.60
1902	5.83	— 3.35	1902	37.93	+ 1.12
1901	4.54	— 2.06	1901	53.93	— 14.88
1900	6.44	— 3.96	1900	64.10	— 25.05

Total rainfall for 1904 as compared with average total of past ten years.

1904...............	39.05	0.00
Ten years average,	51.55	— 12.50

The accompanying record of rainfall, Table 3, is the tabulation of rainfall for the eleven years previous to December 31, 1904.

(1) This record shows the monthly rainfall and total for any given number of months each year, by reading from left to right.

(2) The total rainfall per annum and the average monthly rainfall.

(3) The average rainfall for each month in any given number of years.

(4) The average total in any given number of months in any given number of years.

(5) The average annual rainfall for any given number of years.

(6) The excess or deficit as compared with ten years average, to 1902, inclusive.

CANADIAN SEISMOGRAPHIC RECORDS.

By Prof. R. F. STUPART, Director Canadian Meteorological Service.

During the month of April the seismograph at Toronto showed disturbances on eight days and that at Victoria, B. C., on nine days. Of these disturbances only that on the 4th was pronounced, the others being very small.

The record of the 4th was that of the great earthquake in India, and is well marked on both traces, fig. 1, Toronto, and fig. 2, Victoria, but the movement was greater at Toronto. The preliminary tremors were registered by both instruments at practically the same instant as were also the large waves, but the maximum movement was recorded at Toronto about three minutes earlier than at Victoria. The duration of disturbance as registered at Toronto was $3^h\ 25.8^m$, and at Victoria $3^h\ 26.3^m$.

TABLE 1.—*Register from Toronto, Canada,*

P. T. = preliminary tremors. L. W. = large waves. Time is Greenwich civil time, given in hours, minutes, and decimals of minutes; 0 or 24 H = midnight
Scale value—one millimeter of displacement of outer end of boom = a tilt of 0.67″.

No.	Date, 1905.	P. T. Commence.	L. W. Commence.	Max.	End.	Max. Amplitude.	Duration.	Remarks.
		h. m.	h. m.	h. m.	h. m.	mm.	h. m.	
570	April 4	1 14.2	1 50.2	1 54.3	4 40.0	4.0	3 25.8	Moderate, India.
571	April 12	3 18.0	....	....	3 22.0	0.05	0 4.0	Very slight thickening.
572	April 16	17 32.0	....	....	17 39.0	0.1	0 7.0	Do.
573	April 19	13 00.0	....	....	14 20.0	0.15	1 20.0	Marked and extended thickening.
574	April 25	17 49.3	....	....	17 57.1	0.1	0 7.8	Slight thickening, Persia.
575	April 26	5 51.1	....	....	5 58.1	0.1	0 7.0	Do.
576	...do....	22 2.3	....	....	22 48.0	0.25	0 45.7	Very small, began abruptly.
577	April 28	17 9.5	....	....	17 32.7	0.15	0 23.2	Thickening.
578	May 9	6 53.2	....	6 58.3	7 47.3	0.90	0 54.1	Small, southern Mexico.
579	May 11	17 35.5	....	....	18 20.3	0.05	0 44.8	Minute and extended thickening.
580	May 12	3 13.8	....	....	3 19.8	0.05	0 6.0	Minute thickening.

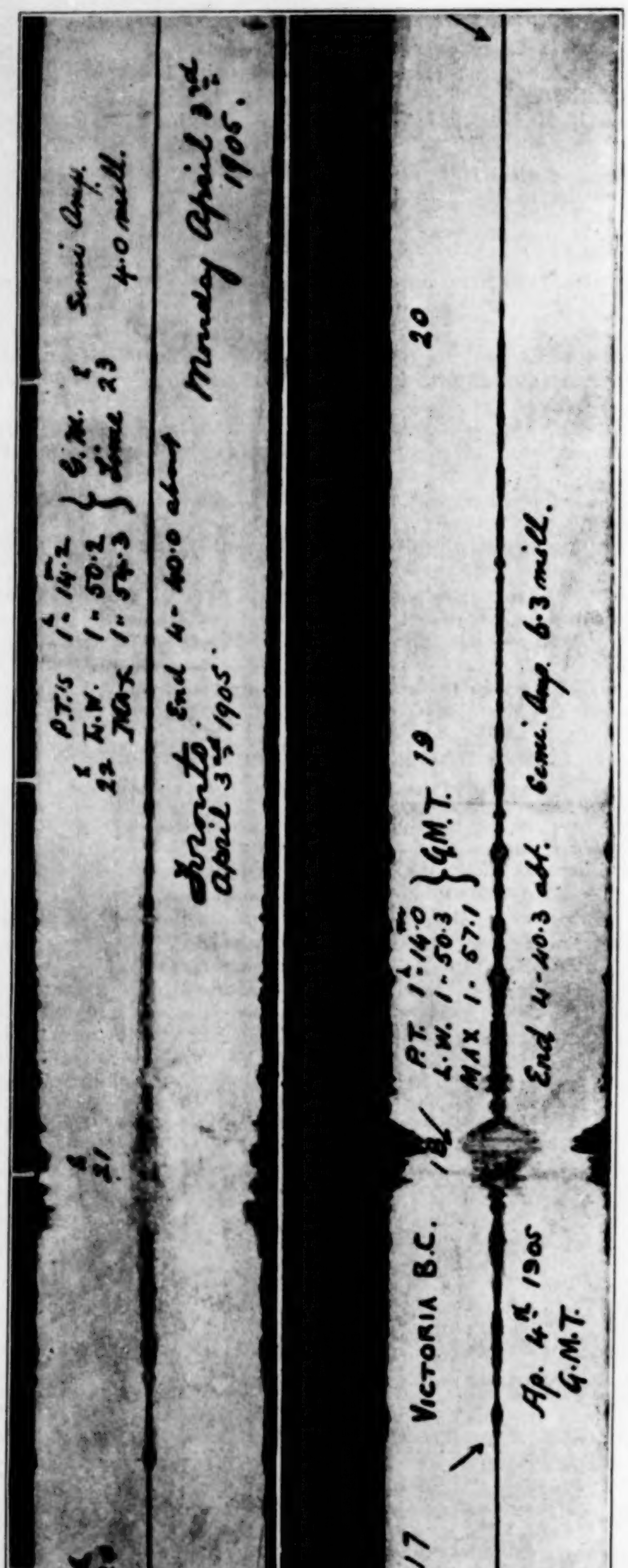

TABLE 2.—*Register from Victoria, B. C.*

Scale value—one millimeter of displacement of outer end of boom = a tilt of 0.76″.

No.	Date, 1905.	P. T. Commence.		L. W. Commence.		Max.		End.		Max. Amplitude.	Duration.		Remarks.
		h.	*m.*	*h.*	*m.*	*h.*	*m.*	*h.*	*m.*	*mm.*	*h.*	*m.*	
583	April 4	1	14.0	1	50.3	1	57.1	4	40.3	6.3	3	26.3	Large, began abruptly, India.
584	April 12	3	3.0	.....	.....	.....	.....	3	9.0	0.1	0	6.0	Brief thickening.
585	April 16	17	30.8	.....	.....	.....	.....	17	40.8	0.1	0	10.0	Slight thickenings.
586	April 19	12	44.6	.....	.....	12	56.0	14	10.5	0.15	1	25.9	Thickenings, quiet intervals.
587	April 23	23	22.6	.....	.....	.....	.....	23	32.0	0.15	0	9.4	Thickenings.
588	April 24	24	46.3	.....	.....	.....	.....	0	52.3	0.10	0	6.0	Very slight thickening.
589	April 22	13	0.4	.....	.....	13	9.4	13	18.4	0.4	0	18.0	Marked thickening.
590	April 26	6	4.4	.....	.....	.....	.....	6	8.4	0.1	0	4.0	By slight thickening.
591	...do....	21	55.0	.....	.....	.....	.....	23	40.0	0.1	1	45.0	Brief thickening at intervals.
592	May 9	6	58.6	.....	.....	7	2.6	7	42.6	0.55	0	44.0	Very small, southern Mexico.
593	May 11	17	23.4	.....	.....	.....	.....	18	28.4	0.1	1	5.0	Extended and minute thickenings.

SUPPLYING MOISTURE IN CONNECTION WITH ARTIFICIAL HEATING.

By Mr. G. A. LOVELAND, Section Director.

In the report for April, of the Nebraska Climate and Crop Service, Mr. G. A. Loveland, Section Director, writes as follows:

In the absence of more accurate data in the matter of the cost of supplying moisture in artificial heating a few estimates have been made from the experience of four winters in supplying moisture to a dwelling house.

In southeastern Nebraska, with a difference between the inside and outside temperature of from 35° to 50° as is usually the case in winter, from 20 to 40 quarts of water should be evaporated daily in a dwelling house containing 14,000 cubic feet. Experience has shown that this does not increase the relative humidity by more than 10 per cent, nor maintain it above 35 per cent in the house, while that of the outside air is from 60 to 75 per cent.

Experience also seems to indicate that the relative humidity inside the house should not exceed 40 per cent at the most and probably should not exceed 35 per cent in an ordinary dwelling house in winter, else the condensation on the windows will be sufficiently great to be very troublesome. However, the increase of 10 per cent makes a material difference in the feeling of the air. Double windows throughout the house would probably allow a decidedly greater increase in relative humidity without inconvenience.

To evaporate 20 to 40 quarts of water would require 43,000 to 86,000 units of heat (British thermal units) or a very approximate estimate of 3 to 7 pounds of anthracite coal.

In actual experience the temperature of the room was maintained nearly as high with the added moisture as though it had been dry. Certainly the difference did not exceed 2° on the average. The number of units of heat required to evaporate the 20 quarts of water, 43,000, would be sufficient to raise the temperature of the air in the dwelling house, 14,000 cubic feet, 2° and allow for a complete change of air three and one-half times each hour. This is in excess of the probable number of times such change occurs. The slightly additional expense required to increase the moisture in a room is fully compensated by the improvement in comfort and health.

NOTES AND EXTRACTS.

METEOROLOGY AND THE TEACHERS OF PHYSICS.

The forty-second meeting of the Eastern Association of Physics Teachers was held Saturday, May 20, 1905, at the office of the U. S. Weather Bureau in Boston, Mass., and by adjournment at the meteorological laboratory of Prof. R. DeC. Ward in the museum of Harvard University at Cambridge. At this meeting special attention was given to the teaching of meteorology. Mr. J. W. Smith, District Forecaster, described the Weather Bureau work. Prof. William M. Davis spoke on some problems connected with the circulation of the atmosphere and Prof. R. DeC. Ward discussed Dr. H. Hildebrand Hildebrandsson's views, as follows:

HILDEBRANDSSON ON THE GENERAL CIRCULATION OF THE ATMOSPHERE.

Professor Ward discussed Dr. H. Hildebrand Hildebrandsson's views regarding the general circulation of the atmosphere. He spoke of the part taken by Doctor Hildebrandsson in proposing a simple scheme of cloud classification in 1887, together with Mr. Ralph Abercromby, and in bringing about the series of international cloud observations which was continued during the so-called international cloud year. With the increasing number of observations of the direction of cloud movement, it has become possible to study much more closely the movements of the atmosphere up to heights of five or six miles, and by means of observations of the drift of *ballons-sondes* and of the dust thrown out by volcanoes, the direction of movement of still higher currents may be determined. Professor Ward summarized the results of Doctor Hildebrandsson's study of the international cloud year observations, and of other available records, as set forth in his "Rapport sur les Observations Internationales des Nuages au Comité International Météorologique. I. Historique: Circulation générale de l'Atmosphere", which has been translated into English by R. G. K. Lempfert and published in the Quarterly Journal of the Royal Meteorological Society for October, 1904, pp. 317-343. The main points in this discussion are as follows:

1. In the vicinity of the equator, in the belt of the equatorial calms, the upper current is from the east throughout the year.
2. Above the trades there are anti-trades, from southwest in the Northern and from northwest in the Southern Hemisphere.
3. These anti-trades extend as far as the polar limits of the trades, but do not pass these limits. Above the tropical high-pressure belts the upper current is from the west, and in these belts the upper current descends to supply the trades.
4. In the temperate zones the atmospheric circulation is a great rotatory movement around the pole. The air in the lower strata approaches the center of the whirl, while that in the upper strata recedes from the center more and more as the altitude increases up to the greatest altitudes from which there are any observations.
5. The upper strata over the temperate latitudes extend over the the tropical high-pressure belts and descend there.
6. The upper currents from equator to poles, shown in the views of the general circulation given by Ferrel and James Thomson, do not exist below a level of 10-12 miles, according to Hildebrandsson's results. Hence, he believes that the idea of a vertical circulation between tropics and poles must be given up.

Professor Ward pointed out that the conclusions reached by Doctor Hildebrandsson are deduced directly from observation, and that in this report Doctor Hildebrandsson distinctly states that he has carefully avoided all theories. Many interesting problems remain for future study and solution in connection with the general circulation of the atmosphere, and Doctor Hildebrandsson's report is noteworthy as coming so recently and from so high an authority.

Professor Ward invited the members of the association to inspect the laboratories and to examine the many meteorological charts and diagrams which he uses in his courses and which he had kindly laid out for inspection. After viewing these, many fine lantern slides of tornadoes and their effects, waterspouts, lightning, and other allied meteorological subjects were shown the members and were commented upon by Professor Ward.

SOUNDING BALLOONS AT ST. LOUIS, MO.

Under date of February 20, 1905, Mr. A. Lawrence Rotch, Director of the Blue Hill Meteorological Observatory, offered the following correction to the Editor's note on page 521 of the Monthly Weather Review for November, 1904:

It is there said that "the aeronauts of the German Meteorological Office brought to this country for exhibition a very complete collection of balloon apparatus and with this apparatus the officials of the Blue Hill Observatory have made a number of soundings". As a matter of fact, 25 rubber balloons, made in Germany, and 8 instruments, made by M. Teisserenc de Bort of Paris, which were imported by me and paid for by the Department of Liberal Arts of the Exposition, were used in my experiments. It seems only fair to my colleague, M. Teisserenc de Bort, who most courteously supplied me in haste with instruments from his own workshop at cost price, to state that his instruments were used, and to acknowledge my indebtedness to the authorities of the Louisiana Purchase Exposition at St. Louis, who paid some $1200 in order that I might conduct the first experiments in America with ballons-sondes. The experiments were continued during January and February at my own expense. In the 22 ascensions made, all but one balloon and instrument were recovered. A more detailed account of the work will be found in the journal Science.

ATMOSPHERIC EXPLORATIONS IN THE TROPICS.

At the request of the Editor Mr. A. Lawrence Rotch communicates the following items with reference to the meteorological expedition to the Tropics now in progress at the joint expense of Mr. Rotch and the French meteorologist, M. Tiesserenc de Bort.

Mr. Clayton, of the staff of the Blue Hill Observatory, left Boston by the White Star steamer *Romanic* on June 3 for the Mediterranean. During the voyage he will endeavor to obtain observations of the temperature, moisture, and wind high above the ocean by flying kites lifting self-recording instruments, a method first employed at sea by Mr. Rotch, director of the observatory, during a voyage from Boston to Liverpool four years ago. At Gibraltar Mr. Clayton will embark on the steam yacht *Otaria*, belonging to M. Tiesserenc de Bort, the French meteorologist, who has equipped her for kite-flying.

At the joint expense of the owner and of Mr. Rotch, the *Otaria* will proceed along the African coast nearly to the equator, and return by the Azores, making frequent soundings of the atmosphere by means of kites and balloons. The trade winds and doldrums will thus be traversed, and it is hoped that the meteorological conditions prevailing above them, which are practically unknown, will be at least partially revealed. The voyage is expected to last about six weeks.

A despatch received June 10 from Mr. Clayton at the Azores states that during the six days' voyage of the *Romanic* thither four kite flights were made to a height of five-eighths of a mile or more. Aerial soundings within the region of high barometric pressure over this part of the Atlantic have never been made heretofore and are expected to give interesting results.

ATMOSPHERIC ELECTRICITY.

The various difficulties attending the measurement of atmospheric electricity and the details of the best methods of the present time are briefly mentioned in the English journal Nature, May 25, 1905, in an article by Mr. George C. Simpson, who concludes as follows:

These and other difficulties have been so recently recognized and overcome that trustworthy results have as yet hardly been obtained, but the observations appear to justify the following conclusions:

(1) The normal potential gradient remains positive to the highest point yet investigated (5900 meters by Gerdien), but decreases in magnitude as the height increases. This points to the lower regions of the atmosphere containing a positive charge equal to the negative charge on the earth's surface, so that the globe as a whole is not charged.

(2) The number of ions in a cubic meter of air is the same at all heights.

(3) Electricity is dissipated more rapidly from a charged body the higher it is in the atmosphere, this being, no doubt, due to the greater ease with which ions move in rarefied air.

These results require further verification before they can be accepted as final, and it is to be hoped that facilities will be forthcoming for the investigations to be followed up in this country.

APPOINTMENT OF THE SOLICITOR OF THE DEPARTMENT OF AGRICULTURE.

In accordance with General Order No. 85, dated June 17, 1905, Mr. Geo. P. McCabe has been appointed Solicitor of the Department of Agriculture, to take effect July 1, 1905. He will act as the legal adviser of the Secretary, and is charged with the preparation and supervision of all legal papers to

which the Department is a party, and of all communications to the Department of Justice, and to the various officers thereof, including United States attorneys. He will examine and approve, in advance of issue, all orders and regulations promulgated by the Secretary under statutory authority. He will represent the Department in all legal proceedings arising under the various laws entrusted to the Department for execution. He will prosecute applications of employees of the Department for patents under the terms of Department Circular No. 3, 1905. His duties will be performed under the immediate direction of the Secretary.

NOTES ON EARTHQUAKES BY WEATHER BUREAU OBSERVERS.

The following items are extracted from the Monthly Meteorological Reports for May, 1905:

San Luis Obispo, Cal., Thursday, May 25, 1905. Light earthquake, E.-W., 3 seconds duration, at 9^h 49^m p. m.

Sacramento, Cal., Friday May 19, 1905. A slight shock of earthquake reported to have occurred at 4^h 59^m p. m. This shock was not noticed by the observer.

Independence, Cal., Tuesday, May 23, 1905. A very feeble earthquake shock was felt at this place at 6^h 50^m p. m. It was also noticed at Bishop, Cal.

STORM WARNINGS AT WIRELESS TELEGRAPH STATIONS.

Arrangements have been completed for the display of Weather Bureau storm-warning flags at the following-named wireless telegraph stations of the Navy Department:

Seaveys Island Navy Yard, Portsmouth, N. H.
Thatchers Island, Mass.
Nantucket Shoal light-vessel, Mass.
Diamond Shoal light-vessel, off Hatteras, N. C.
Charleston light-vessel, S. C.
Mare Island Navy Yard, Cal.
Yerba Buena, Cal.—*E. B. G.*

ADDENDUM ET CORRIGENDA.

Hawaii.—Continued cool and showery weather in most sections during month; drought in the Kau district of Hawaii broken during last week. Growing cane made good progress, and a few of the plantations finished the harvesting of mature cane; preparation of land and planting for the 1907 crop continued. Rice in all sections ripening with a heavy yield; some early rice already harvested in Hawaii and Oahu. The summer crop of pineapples had begun to mature, and promised well. Coffee trees in leeward section put on an exceptionally fine foliage. Pastures generally in good condition during month.—*Alex. McC. Ashley.*

Monthly Weather Review for 1904, Vol. XXXII, No. 13, Table VII, Hermann, Mo.: Highest water; for "22.7 on July 12", read "23.7 on April 27". Annual range; for "20.7", read "21.7". Camden, Ark.: Highest water; for "35.2", read "33.6". Lowest water; for "3.1", read "2.0". Annual range; for "32.1", read "31.6".

THE WEATHER OF THE MONTH.

By Mr. Wm. B. Stockman, Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and V.

The mean pressure for the month was highest—slightly more than 30.00 inches—over the middle and south Atlantic coasts; and lowest over the middle and southern Plateau and slope regions, with the lowest mean, 29.75 inches, at Santa Fe, N. Mex.

No decided departures from the normal occurred, the pressure being slightly above the normal generally in southern New England, central lower Lake region, the Middle and South Atlantic States, southern Arizona, the western parts of Nebraska and South Dakota, southwestern North Dakota, the eastern parts of Wyoming and Montana, and the extreme northwestern parts of Montana and California; elsewhere it was below the normal.

The mean pressure for the month increased over that of April, 1905, in New England, the Middle and South Atlantic States, extreme eastern Florida, northeastern portion of the east Gulf States, central and eastern portions of Tennessee and the Ohio Valley, the Lake regions, and on the coast of Oregon and northwestern California; elswhere the mean pressure diminished.

The greatest increase occurred in eastern New England, and the maximum decreases over the central portions of the Dakotas, and southeastern Wyoming.

TEMPERATURE OF THE AIR.

The mean temperature for the month was above the normal from the Middle Atlantic States, Lake regions, central Mississippi and lower Missouri valleys southward to the Gulf of Mexico and the central Rio Grande Valley; and below the normal in the remaining districts. The greatest positive departures, +4° to +5°, occurred on the coast of North Carolina and in eastern Mississippi and southeastern Louisiana. The greatest negative departures, —4° to —6°, occurred over the southern Plateau region, and eastern California.

The mean temperature for the month was as high as for any May on record at Corpus Christi, Tex., Elkins, W. Va., Galveston, Tex., Hatteras, N. C., Jacksonville, Fla., Mobile, Ala., New Orleans, La., and Pensacola, Fla.; and 1° higher than any May at Jupiter and Tampa, Fla.; 1° lower at Grand Junction, Colo., Independence, Cal., Lewiston and Pocatello, Idaho; 2° lower at Houghton, Mich., and Modena, Utah, and 3° lower at Syracuse, N. Y.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	53.3	— 0.4	— 8.1	—1.6
Middle Atlantic	12	62.6	+ 1.3	— 6.6	—1.3
South Atlantic	10	73.1	+ 3.2	— 5.4	—1.1
Florida Peninsula*	8	79.1	+ 3.2	+ 1.6	+0.3
East Gulf	9	75.6	+ 3.2	— 8.4	—1.7
West Gulf	7	75.1	+ 2.5	— 8.5	—1.7
Ohio Valley and Tennessee	11	66.6	+ 2.0	— 9.1	—1.8
Lower Lake	8	56.4	— 0.3	—10.3	—2.1
Upper Lake	10	51.0	— 0.7	— 6.0	—1.2
North Dakota*	8	50.2	— 2.7	+ 5.6	+1.1
Upper Mississippi Valley	11	61.1	— 0.4	— 8.0	—1.6
Missouri Valley	11	59.1	— 1.0	— 5.7	—1.1
Northern Slope	7	50.2	— 3.2	— 0.3	—0.1
Middle Slope	6	61.5	— 0.6	— 9.3	—1.9
Southern Slope*	6	69.8	+ 0.9	—13.9	—2.8
Southern Plateau*	13	60.8	— 4.3	— 1.3	—0.3
Middle Plateau*	8	51.6	— 4.0	+ 5.2	+1.0
Northern Plateau*	12	52.2	— 2.6	+ 8.0	+1.6
North Pacific	7	52.5	— 1.3	+ 9.4	+1.9
Middle Pacific	5	57.7	— 2.4	+ 7.9	+1.6
South Pacific	4	60.0	— 2.4	+ 9.1	+1.8

* Regular Weather Bureau and selected cooperative stations.

By geographic districts the temperature was above the normal in the Middle, South Atlantic, and Gulf States, Ohio Valley and Tennessee, and southern slope region; and below the normal in the remaining districts.

Maximum temperatures of 90°, or higher, occurred in the southeastern portion of the Middle Atlantic States, the South Atlantic and Gulf States, southern part of the southern slope

region, portions of the southern Peateau region, and interior California; of 100°, or higher, in the lower Rio Grande Valley, western Arizona, and southeastern California; and of 110° in southeastern California and west central Arizona.

Freezing temperatures occurred in the interior of New England, Lake regions, the upper Mississippi and upper Missouri valleys, and in the Plateau and slope regions almost to the Mexican border.

The minimum temperature was as low as any May recorded at Lewiston, Idaho, and Port Crescent and Spokane, Wash.; 1° lower at Walla Walla, Wash., and 4° lower at Williston, N. Dak.

In Canada.—Prof. R. F. Stupart says:

The mean temperature for May has been either just average or from 1° to 2° below average over the larger portion of the Dominion; southern Alberta and western Assiniboia alone showing a somewhat larger negative departure. One of the features of the month has been the absence of pronounced extremes, no very marked heat terms having occurred, and, on the other hand, the frosts recorded were not as a rule severe, except in portions of British Columbia and in the Maritime Provinces.

PRECIPITATION.

The distribution of total monthly precipitation is shown on Chart III.

The distribution of precipitation was uneven, but the amounts were generally below the normal in New England, the Middle Atlantic States, northeastern Georgia, western South Carolina, southern Florida, extreme eastern Tennessee, southwestern Mississippi, southern Louisiana, extreme southeastern Texas, portions of the central Mississippi and lower Missouri valleys, northern lower Michigan, upper Michigan generally, northeastern Minnesota, western North Dakota, eastern Montana, the coast of Washington, central Idaho, central and western Oregon, extreme northwestern California, north-central Nevada, central Colorado, New Mexico, and southern Arizona; and above the normal in the remaining districts.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	2.13	60	—1.4	—5.4
Middle Atlantic	12	2.93	81	—0.7	—2.8
South Atlantic	10	5.70	147	+1.8	—0.2
Florida Peninsula*	8	5.16	145	+1.6	+1.9
East Gulf	9	5.65	133	+1.4	+2.1
West Gulf	7	5.46	125	+1.1	+2.8
Ohio Valley and Tennessee	11	5.74	146	+1.8	—2.8
Lower Lake	8	3.70	109	+0.3	—1.7
Upper Lake	10	3.83	115	+0.5	—0.8
North Dakota*	8	3.27	158	+1.2	—1.0
Upper Mississippi Valley	11	4.36	105	+0.2	—2.0
Missouri Valley	11	5.47	131	+1.3	+0.8
Northern Slope	7	3.24	138	+0.9	+1.3
Middle Slope	6	4.09	114	+0.5	+3.7
Southern Slope*	6	6.44	172	+2.7	+7.0
Southern Plateau*	13	0.53	100	0.0	+6.0
Middle Plateau*	8	1.42	139	+0.4	+1.5
Northern Plateau*	12	1.86	106	+0.1	—1.5
North Pacific	7	2.95	107	+0.2	—7.1
Middle Pacific	5	1.94	135	+0.5	—2.2
South Pacific	4	1.28	337	+0.9	+3.2

*Regular Weather Bureau and selected cooperative stations.

The greatest excesses, +4.0 to +6.0 inches, occurred in portions of the Gulf States, upper Ohio and upper Mississippi valleys; and the greatest deficiencies, —2.0 to —3.0 inches over southern New England, the eastern parts of New York, Pennsylvania and Maryland, extreme southern Florida, southeastern Texas, west-central Mississippi, central Illinois, and portions of northeastern Missouri.

By geographic districts the precipitation was normal in the southern Plateau region; below normal in New England and the Middle Atlantic States, and above normal in the remaining districts.

The precipitation was the greatest in any May since the establishment of station by 0.39 inch at Savannah, Ga., 0.41 inch at Huron, S. Dak., 0.58 inch at Grand Junction, Colo., 0.88 inch at San Luis Obispo, Cal., 0.98 inch at Mount Tamalpais, Cal., 1.05 inches at Cincinnati, Ohio, and 1.68 inches at Moorhead, Minn.

Snow occurred in New England, except Rhode Island, New York, northern Pensylvania, upper Michigan, North Dakota, and over the slope and Plateau regions as far south as the northern portions of New Mexico and Arizona, southern Nevada, and central California.

In Canada.—Professor Stupart says:

In British Columbia and Manitoba and over the larger portion of Assiniboia the precipitation was excessive, and this was especially the case between Brandon and Swift Current, where it was about double the average amount and was partly snow which fell heavily on the 10th. A snowfall with high winds also occurred in Manitoba on the 4th and again over a smaller area on the 7th. Over most of Ontario the precipitation was also in excess of the average, but there was a deficiency in a section extending from Peterboro eastward to the counties of Carlton and Lanark. In Quebec and the Maritime Provinces the rainfall was for the most part deficient, particularly in western New Brunswick, while a small excess was recorded in parts of eastern New Brunswick and in Prince Edward Island.

HUMIDITY.

The relative humidity was normal in the upper Lake and southern slope regions; below normal in New England, and above normal in the remaining districts.

The averages by districts appear in the following table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	73	— 5	Missouri Valley	69	+ 4
Middle Atlantic	73	+ 1	Northern Slope	66	+ 8
South Atlantic	79	+ 5	Middle Slope	68	+ 7
Florida Peninsula	78	+ 2	Southern Slope	61	0
East Gulf	78	+ 7	Southern Plateau	40	+ 7
West Gulf	80	+ 5	Middle Plateau	53	+ 7
Ohio Valley and Tennessee	71	+ 3	Northern Plateau	58	+ 2
Lower Lake	73	+ 2	North Pacific	78	+ 2
Upper Lake	72	0	Middle Pacific	71	+ 4
North Dakota	67	+ 5	South Pacific	70	+ 1
Upper Mississippi Valley	71	+ 3			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Amarillo, Tex	9	50	s.	Minneapolis, Minn	4	50	s.
Chattanooga, Tenn	30	51	nw.	Modena, Utah	1	55	sw.
Cleveland, Ohio	11	60	nw.	Mount Tamalpais, Cal	2	51	nw.
Columbus, Ohio	30	59	w.	Do	3	64	nw.
Corpus Christi, Tex	14	60	ne.	Do	8	79	nw.
Devils Lake, N. Dak	3	56	ne.	Do	9	73	nw.
Do	4	55	n.	Do	11	60	nw.
Dodge, Kas	13	50	w.	Do	15	63	nw.
Duluth, Minn	3	54	ne.	Do	19	52	nw.
Do	4	57	ne.	Do	21	56	nw.
El Paso, Tex	10	50	sw.	North Head, Wash	9	54	nw.
Fort Smith, Ark	11	50	sw.	Pittsburg, Pa	17	55	sw.
Fort Worth, Tex	21	66	nw.	Sioux City, Iowa	3	59	s.
Hannibal, Mo	11	54	sw.	Do	4	54	w.
Jacksonville, Fla	31	51	n.	Do	9	52	e.
Lewiston, Idaho	16	62	nw.	Springfield, Mo	29	64	w.
Memphis, Tenn	4	60	nw.	Williston, N. Dak	15	57	nw.

CLEAR SKY AND CLOUDINESS.

The cloudiness was below the average in the Florida Peninsula, the southern slope, southern Plateau, and middle and south Pacific regions; and above the average in the remaining districts.

The distribution of clear sky is graphically shown on Chart IV, and the numerical values of average daylight cloudiness, both for individual stations and by geographic districts, appear in Table I.

The average for the various districts, with departures from the normal, are shown in the following table:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.6	+ 0.1	Missouri Valley	5.9	+ 0.5
Middle Atlantic	5.6	+ 0.4	Northern Slope	6.1	+ 0.7
South Atlantic	5.5	+ 1.1	Middle Slope	4.9	+ 0.1
Florida Peninsula	3.9	— 0.6	Southern Slope	3.5	— 1.0
East Gulf	5.7	+ 1.4	Southern Plateau	2.0	— 0.2
West Gulf	5.5	+ 0.6	Middle Plateau	5.2	+ 1.1
Ohio Valley and Tennessee	5.7	+ 0.6	Northern Plateau	6.1	+ 0.5
Lower Lake	5.6	+ 0.2	North Pacific	6.6	+ 0.7
Upper Lake	5.8	+ 0.3	Middle Pacific	4.1	— 0.1
North Dakota	6.1	+ 0.8	South Pacific	4.0	— 0.2
Upper Mississippi Valley	5.7	+ 0.5			

DESCRIPTION OF TABLES AND CHARTS.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

For description of tables and charts see page 20 of REVIEW for January, 1905.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, May, 1905.*

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
New England.							**53.3**	**− 0.4**										**73**	**2.13**	**− 1.4**										**5.6**	
Eastport	76	69	82	29.84	29.92	− .04	46.8	− 0.7	71	11	55	33	13	39	29	43	39	78	2.64	− 1.0	14	8,434	s.	42	sw.	26	7	10	14	6.7	0.2
Portland, Me.	103	81	117	29.83	29.95	− .02	52.2	− 1.4	80	29	60	36	2	44	28	46	40	68	2.58	− 1.0	13	7,651	s.	41	w.	1	9	13	9	5.7	
Concord	288	70	79	29.64	29.95	− .03	55.1	− 1.5	82	6	67	31	5	44	38	....	....	....	2.45	− 0.8	15	4,843	nw.	28	w.	7	6	17	8	5.9	T.
Northfield	876	16	60	29.01	29.96	− .01	52.0	− 1.7	77	25	63	27	24	41	42	47	41	67	1.74	− 1.1	12	7,369	s.	36	nw.	1	4	16	11	6.4	T.
Boston	125	115	181	29.84	29.98	.00	57.6	+ 1.1	83	7	66	38	2	49	30	50	45	68	1.47	− 2.1	9	8,046	w.	35	sw.	26	9	13	9	5.2	
Nantucket	12	14	90	29.97	29.98	− .01	53.1	+ 0.6	75	29	59	39	5	47	21	51	49	91	2.62	− 0.9	11	11,639	sw.	46	sw.	3	10	14	7	5.5	
Block Island	26	11	46	29.96	29.99	.00	52.3	− 0.1	72	29	58	39	2	46	18	49	46	86	2.35	− 1.4	10	11,322	sw.	43	sw.	3	9	13	9	5.4	
Providence	159	57	67	29.82	29.99	+ .01	57.0	......	84	7	67	34	2	47	34	50	43	67	1.62	......	8	5,537	w.	28	w.	9	15	8	8	4.6	
Hartford	159	115	132	29.82	29.99	+ .01	58.9	......	83	29	69	36	2	49	35	51	44	63	1.25	......	10	6,487	s.	36	s.	26	9	12	10	5.4	T.
New Haven	106	116	154	29.88	29.99	.00	57.6	0.0	83	7	66	35	2	49	30	51	46	71	1.18	− 2.5	8	6,678	s.	33	ne.	4	11	11	9	5.2	
Mid. Atlantic States.							**62.6**	**+ 1.3**										**73**	**2.93**	**− 0.7**										**5.6**	
Albany	97	102	115	29.87	29.97	− .01	59.0	− 0.3	84	15	69	35	2	49	44	52	48	70	0.96	− 2.2	14	6,571	s.	32	se.	5	5	17	9	6.2	
Binghamton	875	79	90	29.06	29.99	+ .01	57.0	+ 0.2	81	3	68	27	2	46	39	....	....	....	2.11	− 2.0	15	4,861	nw.	26	sw.	26	9	11	11	5.8	T.
New York	314	108	350	29.66	29.99	.00	60.5	+ 1.0	80	7	68	41	2	53	28	55	51	77	1.12	− 2.1	9	8,632	s.	48	nw.	1	9	14	8	5.8	
Harrisburg	374	94	104	29.60	29.99	+ .01	62.8	+ 2.6	85	4	72	41	21	54	34	55	49	65	1.73	− 3.0	11	5,415	nw.	34	s.	3	10	10	11	5.6	
Philadelphia	117	116	184	29.88	30.01	+ .02	63.5	+ 1.5	84	7	73	44	2	54	32	55	49	65	1.41	− 1.8	11	7,391	sw.	35	e.	4	9	6	16	6.4	
Scranton	805	111	119	29.13	29.99	+ .01	60.4	......	86	4	70	32	2	50	35	54	50	73	1.25	......	14	5,018	sw.	27	sw.	3	4	12	15	6.6	
Atlantic City	52	39	48	29.95	30.01	+ .03	58.8	+ 1.6	83	7	65	42	21	53	29	55	52	82	2.97	+ 0.2	10	6,081	sw.	31	nw.	9	6	7	18	6.7	
Cape May	17	48	52	30.01	30.03	+ .04	59.4	+ 0.8	81	7	66	45	2	53	27	56	....	....	2.62	− 0.5	12	6,084	ne.	30	ne.	31	8	19	4	5.4	
Baltimore	123	69	117	29.86	30.00	+ .01	65.1	+ 0.9	87	15	74	46	21	56	28	58	51	65	1.82	− 2.0	8	5,626	s.	30	e.	4	8	7	16	6.5	
Washington	112	59	76	29.87	29.99	− .01	65.2	+ 1.3	87	15	76	41	2	55	34	59	55	71	3.22	− 0.7	13	4,814	s.	27	nw.	14	7	14	10	5.7	
Lynchburg	681	83	88	29.26	29.99	− .01	67.8	+ 1.8	89	9	78	44	21	57	31	61	57	74	6.11	+ 2.2	14	2,762	s.	29	nw.	15	9	17	5	4.8	
Mount Weather	1,725	10	57	28.20	29.99	− .01	60.9	......	81	4	69	43	1	52	32	54	50	73	3.39	......	12	11,226	nw.	40	nw.	7	14	9	8	4.4	
Norfolk	91	102	111	29.91	30.01	+ .01	68.8	+ 2.4	90	30	77	50	2	60	27	62	59	77	2.30	− 2.0	11	6,522	s.	36	w.	16	8	12	11	5.8	
Richmond	144	82	90	29.86	30.01	+ .02	69.4	......	90	30	79	47	2	60	31	....	....	....	4.09	......	14	4,099	se.	29	sw.	16	19	10	2	3.3	
Wytheville	2,293	40	47	27.66	29.99	.00	63.8	+ 1.7	86	4	74	38	2	53	37	58	55	81	8.75	+ 5.0	15	3,403	w.	30	nw.	12	8	17	6	5.0	
S. Atlantic States.							**73.1**	**+ 3.2**										**79**	**5.70**	**+ 1.8**										**5.5**	
Asheville	2,255	53	75	27.70	30.00	+ .01	65.6	+ 2.9	86	12	76	42	2	55	30	60	58	81	5.59	+ 2.0	18	4,776	nw.	42	se.	4	9	8	14	6.2	
Charlotte	773	68	76	29.19	30.01	+ .02	70.8	+ 2.4	90	30	79	53	24	62	26	64	60	76	6.08	+ 1.7	15	4,392	sw.	36	ne.	13	5	18	8	5.9	
Hatteras	11	12	47	30.00	30.01	.00	71.4	+ 5.0	82	31	76	59	2	66	14	67	65	84	7.73	+ 3.1	12	9,454	sw.	34	ne.	1	14	13	4	4.3	
Raleigh	376	71	79	29.60	29.99	.00	71.0	+ 3.5	91	12	80	51	25	62	28	64	61	76	7.76	+ 3.3	15	4,243	sw.	46	nw.	12	8	16	7	5.1	
Wilmington	78	82	90	29.91	29.99	− .02	72.8	+ 3.1	92	12	80	54	24	65	25	67	65	82	5.76	+ 1.6	14	5,553	sw.	25	nw.	12	7	17	7	5.6	
Charleston	48	14	92	29.96	30.01	.00	75.5	+ 3.1	92	31	81	64	18	70	22	69	67	81	4.33	+ 0.3	15	7,983	s.	39	e.	24	6	19	6	5.5	
Columbia, S. C.	351	41	57	29.62	30.00	.00	73.8	+ 1.4	95	30	83	56	2	65	25	66	62	74	3.75	− 0.1	12	4,605	sw.	40	sw.	10	6	13	12	6.2	
Augusta	180	89	97	29.80	29.99	.00	75.4	+ 3.4	95	13	85	58	2	66	26	67	64	72	2.63	− 0.8	10	4,377	nw.	25	s.	15	8	16	7	5.1	
Savannah	65	81	89	29.94	30.01	+ .01	76.8	+ 3.9	95	13	85	61	18	69	24	69	67	81	6.69	+ 3.8	17	5,567	sw.	30	nw.	16	6	8	17	6.6	
Jacksonville	43	101	129	29.94	29.99	− .01	78.1	+ 3.2	92	30	86	63	1	70	24	71	69	79	6.68	+ 2.7	16	6,122	s.	51	n.	31	14	11	6	4.5	
Florida Peninsula.							**79.8**	**+ 2.8**										**78**	**1.89**	**− 1.7**										**3.9**	
Jupiter	28	10	48	29.97	30.00	+ .02	78.8	+ 3.1	88	26	84	67	24	73	17	74	72	80	3.35	− 1.9	8	7,498	se.	30	sw.	26	13	15	3	4.2	
Key West	22	10	53	29.95	29.97	.00	81.2	+ 1.8	89	27	85	74	26	77	12	74	72	76	0.54	− 2.6	6	7,177	se.	48	nw.	26	15	12	4	4.0	
Tampa	34	79	96	29.95	29.98	− .01	79.4	+ 3.4	92	30	89	66	19	70	24	72	69	77	1.77	− 0.7	12	4,927	e.	27	e.	24	15	13	3	3.6	
East Gulf States.							**75.6**	**+ 3.2**										**78**	**5.65**	**+ 1.4**										**5.7**	
Atlanta	1,174	190	216	28.78	30.00	+ .01	71.8	+ 3.0	91	29	80	55	18	64	22	66	63	79	3.32	+ 0.1	15	7,830	w.	36	nw.	28	8	15	8	5.4	
Macon	370	93	99	29.60	29.99	.00	75.4	......	94	29	84	58	18	66	26	....	....	....	3.09	......	13	3,980	nw.	30	sw.	22	5	9	17	6.9	
Pensacola	56	79	96	29.92	29.98	− .01	76.8	+ 3.3	88	30	82	62	1	72	18	....	....	....	5.27	+ 1.9	10	7,189	s.	39	sw.	15	13	8	10	4.9	
Birmingham	700	136	143	29.22	29.97	− .01	74.2	+ 1.3	93	29	83	53	1	66	27	....	....	....	5.86	+ 2.0	14	5,659	sw.	34	se.	21	3	18	10	6.5	
Mobile	57	88	96	29.91	29.97	− .02	77.0	+ 3.4	91	29	84	61	1	70	23	71	68	78	7.75	+ 3.4	8	5,074	s.	26	se.	22	8	15	8	5.3	
Montgomery	223	100	112	29.74	29.98	− .01	75.9	+ 3.1	94	29	85	56	1	67	25	70	67	78	9.10	+ 5.0	12	4,553	sw.	25	sw.	22	11	8	12	5.6	
Meridian	375	84	93	29.56	29.95	− .03	74.8	+ 4.4	91	28	84	52	18	66	33	....	....	....	6.73	+ 1.9	9	3,812	sw.	28	se.	14	10	12	9	5.2	
Vicksburg	247	62	74	29.66	29.94	− .03	75.4	+ 2.8	90	30	84	56	1	67	24	69	66	78	2.95	− 2.0	8	4,677	s.	28	w.	25	6	14	11	6.3	
New Orleans	51	88	121	29.90	29.95	− .02	78.6	+ 4.0	91	31	86	60	1	71	19	71	69	78	4.23	− 0.7	10	6,195	s.	27	s.	14	10	12	9	5.2	
West Gulf States.							**75.1**	**+ 2.5**										**80**	**5.46**	**+ 1.1**										**5.5**	
Shreveport	249	77	84	29.66	29.92	− .03	75.8	+ 2.7	91	28	84	54	1	68	25	69	66	76	8.65	+ 4.5	12	5,467	se.	36	s.	8	8	13	10	5.6	
Fort Smith	457	79	94	29.42	29.89	− .04	70.4	+ 2.2	90	29	79	48	1	62	32	64	61	75	4.92	+ 0.2	13	6,735	e.	50	sw.	11	9	13	9	4.8	
Little Rock	357	93	100	29.55	29.91	− .04	71.8	+ 2.5	90	28	79	53	1	64	25	66	63	78	8.08	+ 2.3	12	5,859	s.	44	s.	13	4	14	13	6.4	
Corpus Christi	20	48	53	29.85	29.87	− .03	78.0	+ 2.6	86	29	82	63	15	74	19	74	72	85	3.96	+ 0.7	7	10,040	se.	60	ne.	14	5	18	8	5.4	
Fort Worth	670	106	114	29.18	29.88	− .03	73.0	......	87	30	81	50	1	65	26	....	....	....	5.45	......	12	8,174	s.	66	nw.	21	13	12	6	4.8	
Galveston	54	106	112	29.86	29.92	− .02	77.8	+ 2.0	88	23	82	61	1	74	16	73	72	86	1.70	− 2.1	4	9,652	s.	44	n.	25	6	18	7	5.7	
Palestine	510	73	79	29.37	29.89	− .04	74.8	+ 3.5	88	30	83	55	1	67	23	69	67	80	6.79	+ 1.0	11	6,034	s.	33	nw.	21	3	21	7	6.2	
San Antonio	701	80	91	29.13	29.84	− .06	77.0	+ 2.1	92	30	85	57	16	68	27	70	68	78	4.11	+ 0.9	7	4,781	se.	24	ne.	25	9	15	7	5.1	
Taylor	583	55	63	29.26	29.87	− .04	76.2	......	92	22	85	56	16	68	26	....	....	....	2.68	......	8	7,196	s.	39	se.	14	6	15	10	5.6	
Ohio Val. and Tenn.							**66.6**	**+ 2.0**										**71**	**5.74**	**+ 1.8**										**5.7**	
Chattanooga	762	106	112	29.20	30.00	+ .01	71.2	+ 3.5	90	29	80	51	2	62	25	65	61	75	6.57	+ 2.7	18	4,882	sw.	51	nw.	30	5	14	12	6.3	
Knoxville	1,004	35	88	28.95	29.99	.00	69.4	+ 3.2	88	11	79	47	1	59	34	63	59	75	3.80	− 0.1	12	4,746	sw.	42	nw.	6	3	21	7	5.8	
Memphis	399	76	97	29.54	29.95	− .01	71.6	+ 1.4	88	29	78	54	1	65	26	65	62	76	7.16	+ 2.6	14	6,639	sw.	60	nw.	4	7	7	17	6.4	
Nashville	546	122	134	29.40	29.98	.00	70.9	+ 2.6	92	29	79	48	1	63	29	64	60	72	6.00	+ 2.4	11	5,424	s.	33	s.	2	6	16	9	5.6	
Lexington	989	75	102	28.92	29.97	− .02	65.8	+ 2.8	86	29	75	43	1	57	30	....	....	....	5.54	+ 2.0	14	7,012	s.	42	w.	4	10	16	5	4.4	
Louisville	525	114	136	29.40	29.98	.00	68.9	+ 2.8	90	29	79	47	1	59	33	60	55	66	6.79	+ 3.1	14	5,956	s.	40	sw.	4	6	9	16	6.6	
Evansville	431	72	82	29.48	29.94	− .03	68.6	......	90	29	77	50	1	60	28	....	....	....	4.17	......	9	5,865	s.	34	s.	14	6	24	1	5.3	
Indianapolis	822	154	164	29.08	29.96	− .01	63.1	− 0.1	85	11	72	41	1	54	33	57	52	70	5.47	+ 1.3	14	8,259	s.	48	s.	30	6	11	14	6.3	
Cincinnati	628	152	160	29.30	29.97	− .02	66.0	+ 1.3	87	4	75	42	1	57	34	58	52	66	9.52	+ 6.1	14	4,911	se.	38	ne.	11	6	13	12	6.1	
Columbus	824	173	190	29.11	29.97	− .01	62.3	+ 0.3	87	4	72	36	1	53	36	56	53	75	4.38	+ 0.1	15	8,017	sw.	59	w.	30	8	10	13	5.7	
Pittsburg	842	336	352	29.09	29.99	.00	63.5	+ 1.3	88	4	73	38	1	54	34	54	47	61	2.79	− 0.6	12	7,178	sw.	55	sw.	17	12	5	14	5.4	
Parkersburg	638	77	84	29.33	29.98	− .01	64.8	+ 1.8	90	4	75	42	1	55	41	58	54	72	5.51	+ 2.1	12	3,873	s.	36	nw.	29	14	11	6	4.1	
Elkins	1,940	41	50	27.98	30.00	.00	62.1	+ 3.1	88	4	74	31	21	50	49	54	50	72	5.41	− 0.6	13	2,953	w.	23	w.	6	11	7	13	5.8	
Lower Lake Region.							**56.4**	**− 0.3**										**73**	**3.70**	**+ 0.3**										**5.6**	
Buffalo	767	178	206	29.14	29.97	.00	53.8	− 0.2	76	25	62	32	1	46	27	49	46	79	3.23	− 0.2	13	9,102	sw.	42	sw.	5	4	15	12	6.6	T.
Oswego	335	76	91	29.59	29.96	− .01	52.4	− 1.6	80	25	61	32	2	44	33	48	44	75	3.26	+ 0.4	16	6,876	w.	30	s.	5	7	13	11	5.7	T.
Rochester	523	81	102	29.40	29.98	+ .01	56.0	− 0.3	83	25	66	33	1	46	36	49	44	69	2.05	− 1.3	12	6,223	w.	30	w.	15	4	13	14	6.7	T.
Syracuse	597	97	113	29.34	29.99	+ .01	56.3	......	79	25	65	31	1	48	30	....	....	....	2.21	......	16	8,653	nw.	44	nw.	19	7	15	9	5.5	0.3
Erie	713	92	102	29.21	29.98	.00	56.0	− 0.7	80	25	64	34	1	48	36	50	46	72	3.97	+ 0.1	14	6,815	s.	29	se.	5	8	9	14	6.2	
Cleveland	762	190	201	29.16	29.98	.00	57.4	− 0.3	83	4	66	34	1	49	39	54	51	78	3.69	+ 0.1	14	10,088	s.	60	nw.	11	7	19	5	5.2	
Sandusky	629	62	70	29.29	29.97	− .01	59.2	+ 0.7	86	4	67	36	1	51	39	....	....	....	4.76	+ 1.3	13	6,134	sw.	36	w.	16	11	11	9	4.7	
Toledo	628	120	127	29.29	29.97	.00	59.2	− 0.2	85	4	69	32	1	50	38	52	47	67	4.32	+ 1.0	12	7,702	sw.	37	w.	16	14	11	6	4.2	
Detroit	730	153	193	29.16	29.96	− .01	57.4	− 0.1	80	2	66	30	1	48	38	52	47	71	4.31	+ 0.8	19	8,310	sw.	40	s.	25	7	18	6	5.4	
Upper Lake Region.							**51.0**	**− 0.7**										**72**	**3.83**	**+ 0.5**										**5.8**	
Alpena	609	13	92	29.30	29.96	− .01	49.6	+ 0.6	76	24	59	26	1	40	34	45	41	74	2.26	− 1.2	13	7,456	nw.	38	w.	5	12	9	10	5.3	
Escanaba	612	40	48	29.28	29.94	− .03	47.3	− 2.0	68	19	55	26	1	40	27	44	39	74	3.07	− 0.3	13	6,095	ne.	26	nw.	19	13	5	13	5.5	
Grand Rapids	707	127	165	29.18	29.95	− .01	56.2	− 2.3	86	3	66	31	1	47	29	50	45	70	5.97	+ 2.5	14	8,261	sw.	39	w.	11	9	12	10	5.7	
Houghton	668	66	74	29.21	29.94	− .03	47.8	......	78	31	57	27	1	39	35	....	....	....	2.85	......	14	6,190	e.	35	ne.	15	12	6	13	5.6	1.3
Marquette	734	76	116	29.15	29.96	− .01	46.6	− 2.4	75	13	53	31	1	40	27	40	34	67	3.60	+ 0.6	14	7,148	nw.	32	sw.	5	7	12	12	6.0	T.
Port Huron	638	70	120	29.28	29.98	+ .01	54.9	+ 1.7	79	2	64	27	1	45	39	50	46	74	3.39	0.0	16	7,742	s.	40	se.	10	13	9	9	5.3	
Sault Ste. Marie	614	40	61	29.26	29.97	+ .02	46.7	− 1.1	73	31	56	30	1	38	33	42	37	71	2.19	0.0	12	6,820	w.	33	sw.	24	10	10	11	5.4	
Chicago	823	241	274	29.06	29.95	− .01	56.4	+ 0.3	84	4	64	38	1	49	28	52	48	78	5.14	+ 1.4	13	11,878	ne.	48	sw.	14	10	12	9	5.4	
Milwaukee	681	124	142	29.21	29.95	− .01	53.1	+ 0.2	85	4	62	35	1	44	36	47	43	73	6.50	+ 2.9	16	8,252	n.	34	w.	5	7	9	15	6.5	
Green Bay	617	49	86	29.26	29.92	− .03	52.0	− 1.9	83	4	61	29	1	43	41	47	43	73	3.75	+ 0.4	15	7,929	ne.	39	w.	5	10	5	16	6.3	
Duluth	1,133	11	47	28.70	29.93	− .03	47.0	0.0	76	31	55	32	1	39	29	41	35	69	2.46	− 1.2	13	12,368	ne.	57	ne.	4	4	13	14	6.7	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, May, 1905*—Continued.

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
North Dakota.							50.2	− 3.3										67	3.62	+ 1.3										6.1	
Moorhead	935	8	57	28.90	29.92	− .02	51.6	− 1.6	80	31	63	30	1	40	35	46	41	72	7.24	+ 4.7	11	6,932	nw.	36	ne.	3	7	13	11	5.7	0.4
Bismarck	1,674	16	57	28.15	29.93	+ .01	50.0	− 4.2	81	31	62	24	5	39	34	44	38	66	1.87	− 0.6	13	9,381	nw.	48	nw.	15	11	11	9	5.6	5.3
Devils Lake	1,482	11	44	28.35	29.92	− .02	48.8	......	83	31	61	24	25	37	34	43	38	68	1.67	......	10	11,215	ne.	56	ne.	3	8	4	19	6.6	7.3
Williston	1,875	14	44	27.94	29.92	− .01	49.1	− 4.1	80	31	61	14	5	37	45	43	35	61	1.74	− 0.3	9	10,013	se.	57	nw.	15	6	12	13	6.4	0.1
Upper Miss. Valley.							61.1	− 0.4										71	4.36	+ 0.2										5.7	
Minneapolis	......	102	208	......	......	......	54.2	− 2.6	77	31	63	36	6	45	30	...	...	...	4.47	+ 0.8	16	9,946	ne.	50	s.	4	6	11	14	6.5	T.
St. Paul	837	171	179	28.98	29.89	− .05	54.4	− 3.1	75	31	63	36	7	46	27	48	43	69	4.13	+ 0.7	13	8,407	n.	44	se.	10	10	7	14	5.8	T.
La Crosse	714	71	87	29.12	29.89	− .05	56.2	− 3.2	83	3	65	37	9	47	33	...	...	...	6.66	+ 3.4	17	3,825	ne.	28	se.	1	9	8	14	6.1	
Madison	974	70	78	28.87	29.91	− .05	55.4	......	80	4	64	33	1	47	27	50	45	73	6.40	+ 2.9	14	7,716	s.	32	ne.	11	10	9	12	5.4	
Charles City	1,015	8	58	28.83	29.90	− .04	55.1	......	78	3	66	34	26	44	37	50	46	75	7.07	+ 3.0	17	6,621	nw.	33	sw.	7	6	11	14	6.2	
Davenport	606	71	79	29.24	29.90	− .05	61.0	+ 0.3	84	29	71	43	26	51	35	55	50	70	3.12	− 1.2	13	6,101	nw.	32	se.	9	10	10	11	5.4	
Des Moines	861	84	101	29.00	29.90	− .03	59.1	− 1.3	80	29	69	38	5	49	36	52	47	66	4.44	− 0.3	15	7,462	sw.	38	sw.	1	4	20	7	5.9	
Dubuque	698	100	117	29.17	29.92	− .03	58.9	− 1.0	80	3	68	40	9	50	27	52	47	69	4.06	+ 0.1	16	5,619	s.	27	nw.	14	11	8	12	5.8	
Keokuk	614	63	78	29.23	29.90	− .04	63.6	+ 1.0	86	29	74	43	26	54	31	57	54	76	3.01	− 1.1	9	6,323	sw.	34	sw.	11	11	12	8	4.8	
Cairo	356	87	93	29.57	29.94	− .02	69.6	+ 2.5	90	29	78	53	1	62	25	64	61	76	4.11	+ 0.3	12	6,361	s.	37	sw.	4	1	17	13	7.3	
La Salle	536	56	64	29.36	29.93	− .03	60.6	......	85	4	71	42	23	50	35	...	...	...	5.51	......	11	6,352	ne.	30	s.	14	10	13	8	4.8	
Peoria	609	11	45	29.27	29.94	− .02	61.6	......	84	10	72	40	7	52	31	...	...	...	4.53	......	9	7,097	s.	46	s.	11	12	12	7	4.5	
Springfield, Ill	644	82	93	29.24	29.92	− .03	63.2	+ 0.8	87	10	73	45	9	53	30	57	53	72	2.28	− 2.7	11	7,292	s.	32	sw.	16	11	10	10	5.5	
Hannibal	534	75	109	29.33	29.89	− .05	64.4	+ 1.3	88	10	74	44	7	54	31	...	...	...	2.30	− 3.1	9	5,127	e.	54	sw.	11	9	13	9	5.3	
St. Louis	567	208	217	29.31	29.91	− .04	67.2	+ 1.4	91	29	76	49	9	58	34	59	54	67	4.67	+ 0.1	11	7,980	se.	46	sw.	14	8	17	6	5.5	
Missouri Valley.							59.1	− 1.0										69	5.47	+ 1.3										5.9	
Columbia, Mo	784	11	84	29.07	29.89	− .05	64.8	+ 0.3	89	10	76	44	12	54	33	...	...	...	4.53	− 0.4	12	6,385	s.	48	w.	11	7	17	7	5.4	
Kansas City	963	78	95	28.89	29.92	.00	65.0	+ 0.8	87	10	74	45	5	56	33	57	52	68	5.36	+ 0.7	9	6,638	s.	38	sw.	8	9	17	5	4.9	
Springfield, Mo	1,324	98	104	28.52	29.90	− .03	64.8	+ 1.6	85	10	72	48	17	57	24	59	55	74	6.29	+ 0.3	16	8,283	s.	64	w.	29	16	8	7	4.5	
Topeka	......	85	89	......	......	......	64.0	+ 0.6	86	10	74	43	12	54	34	...	...	...	5.30	+ 0.3	10	7,705	s.	37	sw.	9	11	13	7	4.6	
Lincoln	1,189	75	84	28.60	29.85	− .06	59.6	− 1.5	85	1	70	36	5	49	36	53	46	65	5.11	+ 0.7	14	9,691	s.	49	n.	14	4	16	11	6.2	
Omaha	1,105	115	121	28.70	29.88	− .04	60.1	− 1.6	84	1	70	38	5	50	32	53	48	68	3.40	− 1.0	11	7,541	s.	44	n.	14	3	16	12	6.4	
Valentine	2,598	47	54	27.19	29.90	.00	51.9	− 3.9	81	31	63	29	5	41	35	45	39	69	5.12	+ 2.3	18	9,347	nw.	48	nw.	4	5	16	10	5.9	3.4
Sioux City	1,135	96	164	28.67	29.88	− .04	56.9	− 1.5	83	1	67	35	5	47	37	...	...	...	8.41	+ 4.7	17	11,444	n.	59	s.	3	2	18	11	6.7	
Pierre	1,572	43	50	28.25	29.91	.00	54.9	− 0.7	84	31	65	33	5	45	33	47	41	65	4.34	+ 2.0	10	6,658	nw.	45	ne.	3	10	7	14	6.3	T.
Huron	1,306	56	67	28.50	29.91	− .01	52.8	− 2.3	79	31	63	30	8	42	37	47	42	72	6.44	+ 3.4	14	8,991	nw.	48	e.	9	5	14	12	6.5	2.0
Yankton	1,233	55	65	28.56	29.87	− .05	55.6	− 2.9	80	1	66	31	11	45	35	...	...	...	5.85	+ 1.5	19	8,032	nw.	38	sw.	4	3	5	23	7.7	T.
Northern Slope.							50.2	− 3.2										66	3.24	+ 0.9										6.1	
Havre	2,505	11	44	27.30	29.93	+ .03	50.6	− 2.7	84	31	63	30	16	39	42	44	37	64	0.83	− 0.7	8	6,857	e.	44	w.	14	11	13	7	5.0	0.6
Miles City	2,371	42	50	27.40	29.95	+ .04	52.5	− 3.9	88	21	64	23	5	41	44	46	38	65	1.78	− 0.5	13	5,928	n.	42	w.	14	8	11	12	6.0	T.
Helena	4,110	8	56	25.74	29.92	− .01	49.0	− 2.8	78	31	59	29	5	39	38	40	33	59	2.09	+ 0.5	13	5,116	w.	34	w.	14	6	12	13	6.4	1.9
Kalispell	2,962	11	34	26.85	29.90	+ .02	50.0	......	80	31	63	26	1	37	44	41	33	61	2.73	......	10	4,129	s.	26	sw.	14	13	12	6	4.5	
Rapid City	3,234	46	50	26.52	29.93	+ .03	49.6	− 3.3	80	21	59	26	4	40	34	45	40	73	6.25	+ 2.6	15	2,758	w.	21	n.	4	6	11	14	6.8	14.6
Cheyenne	6,088	56	64	23.93	29.86	+ .01	47.2	− 3.4	77	31	58	25	11	36	34	41	36	71	4.04	+ 1.8	17	7,465	s.	35	n.	3	1	17	13	7.0	12.5
Lander	5,372	26	36	24.54	29.87	− .01	48.0	− 3.0	79	31	60	26	5	36	36	41	35	67	3.13	+ 0.9	12	3,371	sw.	30	s.	8	8	12	11	6.1	7.4
Yellowstone Park	6,200	11	47	23.78	29.88	− .03	42.0	......	71	31	52	21	5	32	40	35	28	64	2.46	......	18	5,722	nw.	40	w.	20	2	15	14	7.2	6.7
North Platte	2,821	43	52	26.99	29.90	+ .02	54.6	− 3.6	84	1	65	32	11	44	32	48	43	71	4.56	+ 1.9	12	7,883	s.	45	nw.	10	6	12	13	6.2	2.0
Middle Slope.							61.5	− 0.6										68	4.09	+ 0.5										4.9	
Denver	5,291	129	136	24.63	29.84	.00	53.6	− 2.8	80	31	65	29	5	42	38	45	39	68	2.63	− 0.2	16	5,334	n.	37	ne.	27	7	16	8	5.6	2.0
Pueblo	4,685	80	86	25.17	29.80	− .03	57.9	− 0.8	83	23	71	32	5	45	41	47	38	55	0.60	− 1.2	10	6,345	se.	36	w.	10	13	16	2	3.9	0.2
Concordia	1,398	42	47	28.42	29.87	− .04	62.3	+ 0.2	85	1	73	39	6	52	35	55	50	70	4.75	+ 0.7	8	7,096	s.	44	s.	9	10	10	11	5.2	
Dodge	2,509	44	54	27.30	29.86	− .01	61.2	− 1.7	88	8	74	32	5	49	39	54	49	70	5.88	+ 2.7	9	8,981	se.	50	w.	13	9	16	6	5.1	
Wichita	1,358	78	86	28.48	29.90	.00	64.6	+ 0.4	87	10	75	45	5	54	33	57	51	68	4.24	0.0	13	7,520	s.	40	sw.	3	15	12	4	4.3	T.
Oklahoma	1,214	79	86	28.60	29.85	− .04	69.2	+ 1.4	87	11	78	50	17	60	28	62	59	75	6.42	+ 0.9	15	8,703	s.	42	s.	9	6	22	3	5.2	
Southern Slope.							67.8	− 0.4										61	6.10	+ 2.8										3.5	
Abilene	1,738	45	54	28.06	29.83	− .04	72.4	+ 0.2	91	29	82	49	1	62	27	65	61	73	6.05	+ 2.5	7	6,817	s.	48	nw.	23	6	17	8	5.8	
Amarillo	3,676	10	49	26.16	29.82	− .02	63.2	− 1.0	87	8	76	42	4	51	39	55	48	63	6.16	+ 3.0	9	10,103	se.	50	s.	9	26	4	1	1.8	
Roswell	3,578	9	57	26.24	29.80	− .02	67.2	......	92	29	84	38	4	51	41	53	40	48	0.01	......	1	5,361	se.	34	sw.	3	18	9	4	3.0	
Southern Plateau.							62.1	− 4.4										40	0.39	− 0.1										2.0	
El Paso	3,762	10	110	26.09	29.77	− .01	70.8	− 1.5	94	17	85	45	4	56	39	50	30	29	0.03	− 0.5	2	9,052	w.	50	sw.	10	24	6	1	1.7	
Santa Fe	7,013	33	39	23.18	29.75	− .06	54.0	− 1.7	75	31	66	32	4	42	31	41	26	37	0.22	− 0.8	5	7,030	sw.	38	sw.	20	23	8	0	2.1	0.1
Flagstaff	6,907	12	44	23.26	29.78	.00	45.8	− 8.5	77	16	60	20	11	32	44	36	27	56	1.82	+ 0.6	8	7,330	sw.	38	sw.	27	19	6	6	3.1	9.0
Phoenix	1,108	50	56	28.65	29.79	+ .01	70.5	− 3.9	100	16	85	43	11	56	40	53	36	35	0.04	− 0.1	2	3,999	e.	28	sw.	2	22	8	1	1.8	
Yuma	141	16	46	29.66	29.81	+ .02	72.1	− 5.0	103	16	86	49	3	58	39	56	43	43	0.00	0.0	0	5,316	w.	39	w.	2	30	1	0	0.4	
Independence	3,910	11	42	25.84	29.78	− .06	59.4	− 6.0	89	16	72	35	8	46	32	45	29	27	0.25	0.0	5	7,333	se.	46	se.	7	19	8	4	3.1	
Middle Plateau.							52.6	− 3.8										53	1.32	+ 0.4										5.2	
Carson City	4,720	82	92	25.17	29.86	− .05	49.0	− 5.2	82	15	61	23	10	37	40	40	33	61	0.77	+ 0.2	5	5,440	sw.	38	sw.	1	10	13	8	4.7	4.5
Winnemucca	4,344	18	56	25.49	29.85	− .06	51.6	− 2.8	86	16	67	25	22	36	47	40	30	52	0.40	− 0.6	6	5,074	sw.	38	nw.	20	8	8	15	6.0	T.
Modena	5,479	10	43	24.49	29.79	− .03	50.6	− 3.6	80	16	64	28	11	37	42	39	28	52	0.72	0.0	9	9,570	sw.	55	sw.	1	13	14	4	4.3	1.1
Salt Lake City	4,366	105	110	25.48	29.82	− .04	54.4	− 3.4	83	31	65	34	10	44	32	44	33	49	2.74	+ 1.0	12	4,961	se.	47	w.	17	7	14	10	5.8	T.
Durango	6,546	18	56	23.55	29.82	.00	50.5	......	78	31	64	26	11	37	38	39	27	50	1.28	......	7	5,084	w.	36	s.	8	11	11	9	4.9	3.2
Grand Junction	4,608	43	51	25.25	29.79	− .04	57.6	− 4.0	85	31	70	32	3	46	34	47	38	54	1.98	+ 1.4	11	4,268	nw.	32	sw.	8	11	12	8	5.2	2.4
Northern Plateau.							54.1	− 3.2										58	1.72	+ 0.1										6.1	
Baker City	3,471	78	86	26.35	29.92	− .04	49.5	− 3.2	80	16	60	28	22	39	35	41	32	59	0.99	− 0.9	7	4,808	nw.	36	sw.	16	3	11	17	7.3	0.4
Boise	2,739	61	68	27.04	29.89	− .05	54.8	− 3.3	88	16	66	33	22	44	37	45	36	57	1.83	+ 0.2	13	5,512	nw.	36	nw.	20	4	13	14	6.6	T.
Lewiston	757	10	51	29.09	29.89	− .07	58.1	− 2.2	88	15	69	35	1	47	41	...	...	...	1.37	− 0.7	13	5,074	e.	62	nw.	16	9	11	11	5.8	
Pocatello	4,483	46	54	25.35	29.84	− .05	50.8	− 3.5	80	31	62	31	10	40	36	42	33	56	1.13	0.0	14	6,420	sw.	45	sw.	9	8	16	7	5.1	0.4
Spokane	1,929	101	110	27.88	29.92	− .04	54.2	− 2.8	83	31	64	29	1	44	38	45	35	56	1.98	+ 0.6	12	5,329	ne.	38	w.	16	6	8	17	6.8	
Walla Walla	1,000	71	79	28.85	29.92	− .04	57.0	− 3.9	82	26	68	34	1	46	32	49	43	64	2.99	+ 1.3	13	5,134	s.	25	sw.	8	12	13	6	4.9	
N. Pac. Coast Reg.							52.5	− 1.3										78	2.95	+ 0.2										6.6	
North Head	211	11	56	29.80	30.03	.00	50.1	− 2.5	59	29	53	40	9	47	13	48	46	88	2.78	− 0.4	19	12,340	nw.	54	nw.	9	5	8	18	7.0	
Port Crescent	259	12	29	29.72	30.00	− .02	49.0	− 1.4	78	26	56	31	1	42	35	...	...	...	3.83	+ 1.3	13	3,655	nw.	16	w.	8	4	14	13	6.7	
Seattle	123	114	151	29.87	30.00	− .01	54.5	− 0.8	77	26	62	40	1	47	25	49	46	75	3.37	+ 1.0	15	6,250	s.	34	s.	14	3	19	9	5.9	
Tacoma	213	113	120	29.76	29.99	− .03	54.1	0.0	77	27	62	39	1	46	26	...	...	...	4.15	+ 1.6	15	4,978	sw.	27	sw.	8	1	16	14	7.0	
Tatoosh Island	86	7	57	29.88	29.98	− .03	50.0	0.0	62	25	54	42	1	46	16	47	45	86	2.57	− 2.0	14	9,829	sw.	48	sw.	13	3	11	17	7.1	
Portland, Oreg	153	68	96	29.83	29.99	− .04	56.2	− 1.1	83	26	64	41	18	48	31	50	44	68	2.56	+ 0.2	20	4,553	nw.	27	e.	1	3	7	21	7.8	
Roseburg	518	56	60	29.46	29.99	− .04	53.9	− 3.0	85	15	64	35	1	44	43	48	43	72	1.40	− 0.6	13	2,693	nw.	20	ne.	7	10	16	5	4.9	
Mid. Pac. Coast Reg.							57.7	− 2.4										71	1.94	+ 0.5										4.1	
Eureka	62	62	80	29.98	30.06	+ .01	52.8	− 0.7	63	29	56	43	4	49	13	50	47	81	1.39	− 1.4	10	8,023	n.	36	n.	3	12	8	11	4.7	
Mount Tamalpais	2,375	11	18	27.48	29.95	− .05	51.0	......	81	15	57	38	1	45	20	46	42	74	2.68	......	9	12,943	nw.	79	nw.	8	13	7	11	4.7	
Red Bluff	332	50	56	29.56	29.91	− .04	62.5	− 4.5	94	15	73	42	10	52	35	51	41	55	1.86	+ 0.5	8	4,886	se.	25	n.	21	15	9	7	3.7	
Sacramento	69	106	117	29.84	29.91	− .03	60.1	− 3.4	86	15	70	45	1	50	31	52	46	67	2.45	+ 1.5	6	7,154	s.	36	nw.	21	19	7	5	3.4	
San Francisco	155	161	167	29.82	29.99	.00	55.5	− 1.1	85	15	61	48	1	50	33	50	47	77	2.05	+ 1.3	5	8,077	w.	36	w.	24	16	9	6	3.8	
S. Pac. Coast Reg.							60.0	− 2.4										70	1.28	+ 0.9										4.0	
Fresno	330	67	70	29.55	29.91	− .01	63.8	− 4.2	96	15	76	43	10	51	37	53	43	56	1.58	+ 1.2	3	5,463	nw.	27	nw.	25	19	10	2	3.3	
Los Angeles	338	116	123	29.57	29.93	− .02	60.6	− 1.5	92	15	69	46	11	52	31	53	49	72	0.95	+ 0.5	4	4,602	w.	36	w.	2	13	9	9	4.6	
San Diego	87	94	102	29.84	29.92	− .03	59.9	− 0.5	77	15	65	48	11	55	20	55	51	73	0.35	0.0	6	5,495	w.	33	s.	7	21	7	3	3.5	
San Luis Obispo	201	47	54	29.76	29.98	− .02	55.6	− 3.4	91	15	65	38	4	46	37	50	47	77	2.26	+ 1.9	6	4,948	nw.	27	w.	9	12	12	7	4.6	
West Indies.																															
Grand Turk	11	6	20	29.98	29.99	− .01	81.6	......	89	*	88	71	*	76	15	...	...	...	1.62	......	9	......	e.	...	...	...	...	...	...	...	
Havana	57	87	105	29.90	29.96	+ .02	79.9	+ 1.1	90	23	86	70	26	73	18	...	...	...	0.66	− 3.8	7	7,778	e.	36	nw.	26	17	14	0	3.3	
San Juan	82	48	90	29.90	29.99	.00	78.3	− 1.1	88	26	84	70	9	73	13	73	71	79	6.42	+ 1.8	22	9,348	e.	34	se.	21	5	14	12	6.5	

* More than one date.

TABLE II.—*Climatological record of cooperative observers, May, 1905.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Alabama.					
Alaga				6.80	
Anniston	93	47	71.0	8.08	
Ashville	92	48	71.8	7.44	
Benton				6.55	
Bermuda	96	51	76.6	3.07	
Boligee	96	50	76.2	2.98	
Bridgeport				5.07	
Burkeville				6.94	
Calera				5.15	
Camp Hill	96	52	75.7	3.12	
Cedar Bluff				6.55	
Citronelle	92	56	76.4	6.69	
Clanton	94	50	74.2	5.99	
Cordova	95	45	73.8	3.02	
Dadeville				4.91	
Daphne	91	60	77.2	6.95	
Decatur	94	52	72.9	3.55	
Delmar	91	46	72.1	3.47	
Demopolis				5.66	
Eufaula	93	55	75.3	3.83	
Evergreen	95	50	77.6	5.43	
Flomaton	97	53	77.3	9.02	
Florence	92	46	72.2	4.87	
Fort Deposit	97	56	76.4	4.34	
Gadsden	97	51	74.4	7.74	
Goodwater	95	50	74.1	5.38	
Greensboro	92	54	75.7	4.13	
Greenville				7.60	
Guntersville				6.06	
Hamilton	93[d]	46[d]	73.2[d]	3.07	
Highland Home	96	55	75.8	3.99	
Letohatchie				3.96	
Livingston	94	53	71.1	4.16	
Lock No. 4	95	48	73.6	6.96	
Lucy	95	57	78.2	3.95	
Madison Station	93	49	73.0	6.12	
Maplegrove	94	50	70.8	6.32	
Marion	97	54	76.2	4.34	
Milstead				4.52	
Newbern	94	52	75.2	4.89	
Oneonta	92	47	72.3	5.37	
Opelika	94	57	73.3	4.25	
Ozark	97	56	76.2	7.41	
Prattville [f]	92	50	75.0	5.83	
Pushmataha	95	47	76.2	3.14	
Riverton	93	44	71.7	4.26	
Scottsboro	97	44	71.0	5.27	
Selma	95	55	77.4	4.23	
Spring Hill	90	60	75.9	7.27	
Talladega	90	49	71.8	7.10	
Tallassee				4.26	
Thomasville	99	51	76.8	6.40	
Tuscaloosa	96	53	75.0	3.15	
Tuscumbia	93	49	72.7	4.33	
Tuskegee	97	55	76.8	1.67	
Union Springs	94	55	76.1	8.73	
Uniontown	95	49	73.1	3.48	
Valleyhead	93	45	71.2	6.92	
Wetumpka	95	51	76.2	4.70	
Alaska.					
Juneau	74	33	51.8	1.58	
Orca	72	30	45.9	10.48	
Sitka	65	32	49.6	2.44	
Skagway	75	25	49.9	1.11	
Arizona.					
Allaire Ranch				0.00	
Alpine				0.00	
Arizona Canal Co. Dam	104	42	70.8	0.00	
Aztec	109	49	78.6	0.00	
Bisbee	88	40	63.6	0.00	
Blue	91	31	59.2	0.08	
Bowie				0.00	
Buckeye	105[1]	36	67.0[e]	T.	
Casagrande	108	40	73.0	0.00	
Cochise* [1]	99	40	67.0	0.00	
Congress	94	41	66.6	T.	
Douglas	98	39	66.4	0.00	
Dragoon* [5]	84	48	66.8	0.00	
Dudleyville	98	40	67.1	0.28	
Duncan	97	31	61.8	T.	
Fort Apache	89	29	56.9	0.19	
Fort Defiance	81	21	49.6	0.20	T.
Fort Grant	92	40	68.2	0.00	
Fort Huachuca	91	37	60.6	0.00	
Fort Mohave	106	45	72.2	0.22	
Gilabend	108	45	72.6	0.00	
Globe	94	38	65.0	0.44	
Greaterville				6.00	
Greer				0.10	
Huachuca Res				0.00	
Holbrook	89	26	58.3	T.	
Jerome	87	34	61.6	0.90	T.
Kingman	93	35	61.3	0.87	
Maricopa	110	39	71.0	T.	
Mesa	103	39	70.3	0.10	
Mohawk Summit* [1]	110	60	78.9	0.00	
Natural Bridge				0.48	
Nutrioso				0.25	2.0
Arizona—Cont'd.					
Oracle				0.00	
Oro				T.	
Parker	110	39	72.8	0.04	
Phoenix	102	38	69.4	T.	
Picacho* [1]	108	55	75.7	T.	
Pinto				0.06	
Prescott	89	27	54.2	0.88	T.
San Carlos	101	39	66.8	0.08	
San Simon	99	36	65.8	0.00	
Seligman	86	27	53.0	0.68	2.0
Sentinel* [1]	110	57	76.4	0.00	
Showlow				0.28	T.
Superstition				0.06	
Tempe	107	36	69.0	0.03	
Thatcher	98	33	64.8	0.00	
Tombstone	91	39	65.2	0.00	
Tucson	97	39	64.6	0.02	
Upper San Pedro	93	35	63.0	0.00	
Vail* [5]	90	64	75.4	0.00	
Walnut Grove				0.01	
Willcox	98	37	63.6	0.00	
Williams	82	20	49.4	1.33	12.0
Yarnell				0.07	
Young	96	28	60.8	6.44	
Arkansas.					
Amity	88	45	71.4	16.40	
Arkadelphia	92	47	72.6	18.73	
Arkansas City				5.34	
Batesville	87[e]	50[e]	70.0[e]	9.07	
Beebranch	87	43	68.8	6.45	
Black Rock				7.49	
Blanchard	90	48	73.8	5.92	
Brinkley	91	48	72.0	13.38	
Calico Rock				7.40	
Camden	90	51	74.2	6.89	
Clarendon				9.96	
Conway	92	46	71.9	8.71	
Dallas	87	44	70.4	10.80	
Dardanelle				8.10	
Des Arc	90	52	71.7	8.04	
Dodd City	91	43	67.2	9.60	
Dutton	83	42	65.5	14.90	
Eldorado	92	50	73.6	8.68	
Elon	90	50	74.4	6.04	
Eureka Springs	89	48	67.8	13.56	
Fayetteville	86	44	66.8	12.18	
Forrest City	90	48	70.8	12.50	
Fulton				9.64	
Hardy	91	43	68.4	9.46	
Helena	91	50	71.9	6.32	
Hope	94	49	74.4	13.12	
Howe	92	46	73.6	23.50	
Jonesboro	98	46	71.8	6.44	
Lacrosse	92	46	69.8	11.46	
Lake Village	93	50	73.8	6.98	
Lonoke	95	48	72.4	7.46	
Lutherville	89	50	67.8	8.84	
Luxora				5.39	
Malvern	94	43	71.6	12.40	
Marked Tree				6.24	
Marvell	92	49	72.8	9.03	
Mossville	84	43	64.3	11.63	
Mountain Home	89	43	67.2	8.25	
Mount Nebo	85	52	67.8	9.78	
New Lewisville	91	49	73.8	13.78	
Newport	93	47	71.8	8.04	
Oregon	89	42	65.4	9.14	
Osceola	98	53	71.5	5.95	
Ozark	95	50	70.4	7.58	
Perry	92	45	72.6	7.29	
Pinebluff	92	46	72.8	15.71	
Pocahontas	95	43	69.4	7.68	
Pond	86	40	65.6	11.67	
Prescott	91	50	73.1	14.15	
Princeton	94	46	73.3	10.62	
Russellville	91	44	70.8	8.77	
Silversprings	86	44	66.0	13.06	
Spielerville	89	48	70.6	9.33	
Springbank				7.84	
Stuttgart	90	46	72.2	9.52	
Tate	91	41	70.0	7.11	
Texarkana	90	47	73.0	12.71	
Warren	94	46	72.9	6.57	
White Cliffs				13.96	
Wiggs	90	38	70.3	12.72	
Winchester	94	53	74.5	7.17	
Witts Springs	85[e]	47[e]	64.6[e]	6.45	
California.					
Alturas				1.41	T.
Angiola	92	40	64.0	0.05	
Auburn	89	37	58.8	2.70	
Azusa	100	41	60.6	1.29	
Bagdad	105	57	76.7	0.00	
Bakersfield	99	43	68.8	1.08	
Barber				1.46	
Barstow	80	51	65.9	0.00	
Bear Valley				4.14	10.0
Berkeley	86	40	55.6	3.43	
California—Cont'd.					
Bishop	87	29	56.7	0.40	
Blue Canyon	79	30	49.4	5.61	8.0
Bodie	72	5	37.2	3.32	19.5
Bowman				7.25	15.5
Branscomb	85	30	51.2	3.25	
Brush Creek	92	30	56.8	3.54	
Butte Valley				4.56	3.0
Calabasas				0.77	
Calexico	105	48	72.9	0.00	
Campbell	91	35	56.0	2.02	
Campo				2.53	
Cedarville	85	24	49.0	1.03	T.
Chico	89	39	62.2	2.04	
Claremont	94	41	59.4	3.37	
Cloverdale	94	41	59.9	3.51	
Colfax	86	32	57.3	3.21	
Colusa	88	43	62.2	2.71	
Craftonville				4.12	
Crescent City	69	36	51.2	1.63	
Crockers				3.03	4.0
Cuyamaca	74	26	44.6	7.11	1.0
Delta	88	33	58.8	3.41	
Diamond				2.70	
Dobbins	90	39	60.8	3.77	
Durham	94	37	61.3	1.50	
Elcajon	96	41	61.7	1.02	
Electra	93	39	63.6	2.51	
Elmwood	100	40	63.0	1.95	
Elsinore	100	38	64.0	0.92	
Emigrant Gap	70	27	47.1	3.00	18.0
Escondido	89	39	62.8	1.80	
Folsom	95	37	62.0	2.35	
Fordyce				4.70	42.0
Fort Bragg				4.24	
Fort Ross	71	40	54.1	4.58	
Foster				1.94	
Fruitvale				2.60	
Georgetown	85	30	54.2	3.00	
Gilroy (near)	96	36	57.0	2.44	
Greenville	81	26	49.4	0.62	
Hanford	98	42	65.4	0.65	
Healdsburg	94	42	60.4	3.69	
Hollister	95	35	56.1	2.44	
Indio	107	47	74.3	T.	
Idylwild	80	27	47.5	3.77	T.
Imperial	110	46	73.6	0.00	
Iowa Hill	84	32	53.8	3.11	
Isabella	92	40	61.6	1.63	
Jolon				1.69	
Kennedy Gold Mine				2.97	
Kentfield				3.51	
Kernville				1.21	
King City	100	35	56.4	1.33	
Le Grand	100	38	62.9	1.70	
Lemoncove	100	44	65.6	1.70	
Lick Observatory	78	29	45.9	2.27	T.
Livermore	95	36	57.9	1.89	
Lodi	94	40	60.8	2.39	
Lone Pine	87	30	58.5	1.19	
Lordsburg				2.54	
Los Gatos	91	40	57.2	3.53	
Lowe Observatory				4.01	
Magalia	91	38	60.8	3.76	
Mammoth	108	48	75.6	0.00	
Marysville	92	42	62.3	2.12	
Meadow Valley				1.54	4.0
Merced	96	42	63.7	1.82	
Mercury				1.86	
Mills College				2.32	
Milo				2.82	
Milton (near)	88	45	60.9	2.78	
Mohave	96	39	61.8	T.	
Mokelumne Hill				2.52	
Montague	88	32	55.3	1.01	
Monterio	86	32	53.8	3.25	
Monumental	85	28	49.4	2.66	T.
Mount St. Helena				4.15	
Napa	93	41	57.9	2.60	
Needles	102	54	76.8	0.10	
Nevada City	86	28	52.5	4.29	
Newcastle	91	47	64.1	3.67	
Newman	99	41	64.8	1.70	
Niles	90	40	57.4	2.81	
Nimshew				3.78	
Nordhoff	84	30	51.2	3.98	
North Bloomfield	85	29	52.4	4.21	
Oakland	85	45	59.2	2.70	
Ontario (near)	100	40	61.7	1.04	
Orland	101	43	65.6	2.23	
Orleans	100	40	62.6	1.14	
Oroville (near)	93	39	62.2	2.35	
Ozena				1.61	
Palermo	94	39	62.2	1.72	
Peachland	89	38	57.0	3.07	
Pilot Creek				2.93	3.0
Pine Crest	88	43	57.7	2.50	
Placerville	82	32	54.4	2.35	
Point Lobos	78	49	58.8	2.78	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Point Loma				0.51	
Point Reyes Light	77	45	51.4	1.17	
Porterville	99	40	64.0	1.81	
Poway	89	43	62.4	1.90	
Priest Valley				2.33	
Quincy	77	28	51.6	1.44	
Redding	88	41	62.0	1.99	
Redlands	99	40	59.6	1.16	
Reedley	99	38	64.6	1.69	
Represa				2.42	
Riovista	86	43	60.9	2.25	
Riverside	98	38	60.0	0.88	
Rocklin	92	35	60.2	2.59	
Rohnerville				1.16	
Sacramento	86	45	60.6	3.19	
Salinas	94	39	56.4	2.51	
Salton	110	47	74.4	0.00	
San Bernardino	100	37	61.2	1.55	
San Jacinto	80	38	55.8	1.26	
San Jose	94	40	58.8	1.77	
San Leandro	90	39	57.4	2.54	
San Rafael	88[d]	41[d]	58.9[d]	2.38	
Santa Barbara	89	43	58.5	1.44	
Santa Clara College	94	37	56.9	2.01	
Santa Cruz	90	36	55.8	3.47	
Santa Maria	92	39	57.4	1.58	
Santa Monica	90	45	64.8	0.47	
Santa Rosa	87	27	54.9	2.93	
Shasta	89	40	62.6	2.77	
Sierra Madre	92	43	60.1	2.74	
Sisquoc Ranch				2.10	
Sisson	92	30	50.3	4.21	
Sonoma	90	45	63.6	3.27	
Sonora	82	44	61.9	3.47	
Southeast Farallon	60	49	52.0	1.48	
Sterling				2.45	
Stockton	90	43	57.5	2.38	
Storey	94	38	61.6	1.20	
Summerdale	76	24	46.2	3.80	18.0
Summit	71	28	46.6	3.70	34.0
Susanville	80	24	49.6	0.78	
Tejon	90	40	62.2	2.29	
Towle	84	28	51.2	3.39	
Truckee	72	30	50.3	1.12	7.0
Tulare	98	40	63.6	0.96	
Tustin				1.23	
Ukiah	92	35	57.0	2.54	
Upland	90	40	57.4	3.54	
Upperlake	90	31	54.3	1.73	
Upper Mattole				3.24	
Vacaville	80	39	59.4	3.83	
Visalia	99	36	65.4	0.81	
Volcano	111	46	75.2	0.00	
Wasco	100	42	65.4	0.75	
Weldon				0.70	
Westpoint				3.22	
West Saticoy				1.60	
Wheatland	88	40	60.8	2.14	
Willow	90	50	69.0	1.45	
Woodside	86	39	57.4	3.41	
Yosemite	89	26	52.1	2.97	1.0
Zenia	82	28	47.7	2.44	
Colorado.					
Akron				4.37	
Alford	72	25	47.2	2.67	4.5
Antelope Springs	69	0	38.4	1.74	17.6
Ashcroft	71	12	40.9	1.85	
Blaine	81	34	59.3	1.12	
Boulder	76	30	52.5	4.78	3.0
Breckenridge	66	17	39.4	2.17	32.0
Burlington	83	30	54.9	2.83	
Canyon	83	31	56.8	0.95	2.0
Cheesman	78	27	50.6	2.04	
Cheyenne Wells	83	28	55.0	2.10	
Clearview	68	19	42.0	0.77	T.
Collbran	82	28	52.0	2.99	4.0
Colorado Springs	73	29	52.4	1.97	T.
Conejos	78	24	48.6	0.11	
Cripplecreek				1.47	7.4
Delta	90	35	57.8	1.19	
Dunkley	75	18	44.0	1.82	2.5
Eagle	77	25	47.0	1.76	5.0
Fort Collins	76	30	52.1	4.13	1.0
Fowler				2.70	T.
Fox	82	30	54.4	3.27	
Frances	72	22	44.8	3.07	5.5
Fruita	87	33	55.7	1.72	
Garnett	78	20	47.6	0.34	
Gleneyre	75	28	51.8	1.54	
Glenwood Springs	80	29	49.0	1.74	
Greeley	84	31	54.6	5.35	T.
Grover				4.90	
Gunnison	77	21	45.3	0.78	1.0
Halls Gulch	53	11	30.7	3.19	22.0
Hamps	77	27	51.8	3.98	3.0
Hoehne	86	23	50.2	1.42	T.
Holly	86	34	60.8	1.62	
Holyoke (near)	82	29	53.8	4.77	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Idaho Springs	74	26	48.2	2.30	8.2
Lake City	71	18	43.8	1.45	16.0
Lake Moraine	63	16	37.8	1.14	8.0
Lamar	89	36	62.8	1.85	
Laporte				4.70	T.
Las Animas	90	34	62.2	2.51	T.
Lay	79	20	46.4	2.44	10.0
Leroy	79	29	52.3	3.88	T.
Longs Peak	65	13	38.6	3.42	23.0
Mancos	79	22	50.6	1.59	10.5
Marshall Pass				3.26	43.0
Meeker	80	24	48.2	1.78	3.0
Montrose	75[j]	29[j]	49.6[j]	1.18	
Moraine	69	23	44.0	1.14	6.0
Pagoda	80	21	48.2	1.27	
Paonia	86	31	55.7	2.97	
Platte Canyon				2.84	5.0
Rockyford	87	32	59.4	3.13	
Saguache	80	24	49.0	0.10	1.0
Salida	80	25	50.0	0.49	3.0
San Luis	74[j]	22	49.4[e]	0.60	
Santa Clara	79	24	49.5	0.88	1.0
Sheridan Lake	86	31	58.2	2.17	0.2
Silt	82	30	51.8	1.88	1.5
Silverton	67	0	39.8	3.38	18.0
Sugar City				3.14	T.
Sugar Loaf	70	22	44.4	4.98	7.0
Trinidad	80	31	57.6	1.46	
Victor	68	17	42.4	1.46	4.5
Vilas				1.33	
Wagon Wheel	71	14	40.8	1.72	21.0
Waterdale	76	28	50.0	3.12	
Westcliffe	72	24	46.6		3.0
Whitepine	68	9	38.7	1.30	13.0
Wray	86	31	56.8	2.59	
Yuma				3.64	
Connecticut.					
Bridgeport	85	30	58.6	0.91	
Canton	82	30	57.0	0.93	T.
Colchester	82	32	57.4	1.82	
Falls Village				1.45	
Hawleyville	82	29	57.7	1.24	
Lake Konomoc				1.60	
New London	79	35	56.6	1.31	T.
North Grosvenor Dale	83	31	56.6	1.52	
Norwalk	86	27	58.9	0.69	
Southington	82	30	58.4	1.45	
South Manchester				0.77	
Storrs	81	37	56.8	0.90	
Voluntown	83	32	57.8	1.76	
Wallingford				1.00	
Waterbury	85	30	59.5	1.27	T.
West Cornwall	79	29	55.9	2.35	T.
West Simsbury				0.83	T.
Delaware.					
Delaware City				2.75	
Milford	92	40	66.3	2.18	
Millsboro	92	39	64.5	3.34	
Newark	84	35	63.3	1.90	
Seaford	82	40	63.4	5.50	
District of Columbia.					
Distributing Reservoir*[b]	83	50	67.8	2.47	
Receiving Reservoir*[b]	84	48	67.2	2.35	
West Washington	89	40	66.4	3.53	
Florida.					
Apalachicola	91	61	77.6	6.70	
Archer	96	61	79.2	3.90	
Avon Park	94	63	80.0	6.99	
Bartow	96	59	80.5	11.16	
Bonifay	95	56	77.2	9.75	
Brooksville	99	48	80.3	4.25	
Carrabelle	93	59	77.1	4.50	
Caxambas	93	69	80.8	5.35	
Clermont	100	63	81.5	2.88	
De Funiak	97	53	76.0	10.41	
Deland	96	60	80.2		
Eustis	96	59	80.6	3.30	
Federal Point	95	59	78.1	6.49	
Fernandina	94	64	77.3	8.09	
Flamingo	96	67	80.4	5.11	
Fort Meade	96	61	79.7	10.11	
Fort Pierce	92	58	77.8	3.25	
Grasmere	95	60	79.9		
Huntington	96	59	79.4	3.48	
Hypoluxo	89	67	78.8	2.51	
Inverness	94	60	78.6	5.39	
Jasper	94	57	77.6	5.08	
Johnstown	95[e]	57[e]	78.4[f]	7.53	
Kissimmee	93	58	78.6	7.17	
Lake City	96	57	78.5	6.47	
Macclenny	96	57	78.0	5.21	
Madison	95	59	78.7	6.69	
Malabar	94	61	79.4	3.21	
Manatee	95	61	79.6	2.53	
Marianna	101	54	78.4	4.95	
Merritt Island	90	67	78.6	7.31	
Miami	93	65	81.0	3.93	
Middleburg	98	50	77.7	5.78	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Molino	99	52	76.0	10.98	
Monticello	96	57	77.2	6.13	
Mount Pleasant	96	54	77.1	5.82	
Myers	93	65	80.2	3.97	
Nocatee	95	62	79.7	4.92	
Ocala	98	60	79.8	4.00	
Orange City	100	56	80.6	3.14	
Orange Home	97	60	79.2	4.94	
Orlando	94	60	79.0	8.12	
Pinemount	98	56	78.6	3.67	
Plant City	98	59	78.6	9.10	
Rockwell	96[e]	61[e]	80.2[e]	4.20	
St. Andrews	93	54	76.4	10.81	
St. Augustine	96	62	77.6	3.97	
St. Leo	94	63	78.8	8.64	
Sand Key	92	70	80.2	0.33	
Stephensville	95	56	77.8	4.84	
Sumner	93	55	76.6	3.81	
Switzerland	95	59	77.5	7.04	
Tallahassee	93	59	77.2	7.55	
Tarpon Springs	94	59	77.6	1.20	
Titusville	94	57	77.8	5.60	
Wausau		56		13.49	
Georgia.					
Abbeville				2.46	
Adairsville	90	52	72.3	5.90	
Albany	98	51	78.0	6.81	
Allapaha	99	55	77.0	5.21	
Americus	95	57	76.4	4.70	
Athens	93	54	71.4	5.79	
Bainbridge	100	54	78.8	6.76	
Blakely	100	56	79.2[d]		
Bowersville	93	49	70.4	7.10	
Butler				7.26	
Camak	96	56	74.4	2.85	
Canton				6.79	
Carlton				6.56	
Carrollton	90	50	71.9	4.53	
Clayton	88	39	66.8	6.98	
Columbus	98	55	77.4	4.37	
Cordele	96	54	76.2	2.20	
Covington	91	52	73.2	3.76	
Cuthbert	90	58	75.9	3.87	
Dahlonega	87	49	68.0	9.54	
Dawson	97	52	78.8	4.40	
Diamond	86	46	69.0	5.81	
Dublin				4.42	
Dudley	97	53	75.8	3.48	
Eastman	100	56	78.3	2.55	
Eatonton	94	53	73.8	4.01	
Elberton	93	53	72.6	6.25	
Experiment	92	54	73.7	3.38	
Fitzgerald	98	54	77.2	6.02	
Fleming	100	53	77.2	5.62	
Forsyth	94	52	74.1	5.74	
Fort Gaines	94	57	76.9	6.28	
Gainesville	92	53	70.1	4.63	
Gillsville	90	50	71.0	5.67	
Glenville	99	57	78.2	1.98	
Greenbush	91	50	72.0	6.49	
Greensboro	95	52	74.0	2.54	
Griffin	96	54	73.9	4.34	
Harrison	96	52	74.8	3.72	
Hawkinsville	100	53	76.8	3.12	
Lost Mountain	94	50	72.4	5.91	
Louisville	97	55	76.2	4.26	
Lumpkin	95	54	75.3	4.53	
Marshallville	96	57	76.8	7.84	
Mauzy	100	56	77.4	8.30	
Milledgeville	94	54	74.6	4.54	
Millen	98	54	76.6	1.94	
Montezuma				5.48	
Monticello	96	54	74.4	5.57	
Morgan	94	56	76.5	7.20	
Newnan	95	52	73.5	3.26	
Point Peter	93	51	72.4	6.56	
Poulan	97	52	76.2	3.80	
Putnam	100	54	76.8	5.43	
Quitman	98	57	78.2	5.06	
Ramsey	89	48	71.6	5.82	
Resaca				5.35	
Rome	94	48	72.9	6.26	
St. Marys	100	61	78.5	4.83	
Statesboro	99	57	77.8	2.26	
Talbotton	95	50	74.2	5.11	
Tallapoosa	91	50	73.0	5.89	
Thomasville	97	55	77.6	6.36	
Toccoa	89	50	68.4	7.19	
Valdosta	95	55	77.6	5.69	
Valona	97	58	76.8	7.95	
Vidalia	96	59	78.1	3.76	
Washington	90	54	71.8	3.51	
Waverly	97	57	78.2	7.08	
Waycross	100	56	78.6	2.72	
Waynesboro	94	57	74.9	2.16	
Westpoint	98	51	76.0	3.08	
Woodbury	90	50	73.4	3.11	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Idaho.	°	°	°	*Ins.*	*Ins.*
Albion	83	27	52.6	2.90	
American Falls	80	31	50.4	1.82	
Blackfoot	85	30	52.2	0.30	
Blue Lakes	91	32	57.0	1.00	
Burnside	75	30	47.5	2.10	0.5
Caldwell	92	29	56.7	1.99	
Cambridge	86	26	54.0	0.65	
Chesterfield	80	22	47.0	1.20	
Collins	...	...	...	4.98	1.0
Dewey	78	21	44.6	2.50	7.1
Ellerslie	87	30	53.2	1.03	
Fernwood	...	...	...	4.27	
Forney	78	20	46.0	2.29	
Franklin	...	...	...	2.41	
Garnet	94	33	59.9	1.01	
Grangeville	79	29	49.6	5.21	2.0
Hope	...	...	...	4.32	
Idaho City	84	20	51.5	1.70	
Idaho Falls	79	28	50.0	1.90	0.4
Kellogg	86	28	51.4	3.43	
Lakeview	80	30	50.8	2.90	
Landore	75	22	43.1	3.11	11.4
Lemhi Agency	78	20	47.1	1.98	
Lost River	77	24	47.8	2.87	1.0
Lovell	85	24	52.9	2.49	
Malad	76[e]	19[e]	45.8[e]	1.83	
Meadows	81	26	50.0	1.91	6.1
Minidoka	85	30	52.6	1.27	
Mink Creek	83	23	51.4	2.20	2.0
Moscow	80	30	53.2	2.15	T.
Murray	84	24	48.8	3.11	T.
Nevins Ranch	...	...	...	2.56	
Oakley	82	30	50.4	1.46	T.
Ola	84	28	53.4	2.16	
Orofino	94	32	57.0	2.70	
Paris	75	23	46.0	1.56	1.5
Pearl	...	...	...	3.09	2.0
Payette	94	28	58.1	1.62	
Pollock	91	32	54.7	1.55	
Poplar	...	...	...	1.49	
Porthill	80	29	52.2	2.96	
Priest River	81	30	54.8	3.79	
Roosevelt	69	14	38.3	3.61	20.2
St. Maries	85	28	52.4	4.25	T.
Salem	...	...	...	3.98	3.3
Soldier	79	11	48.6	3.88	
Vernon	79	27	47.4	...	
Victor	70	29	47.2	2.67	1.0
Westlake	...	...	...	3.65	
Weston	83[b]	28[b]	51.0[b]	1.75	
Illinois.					
Albion	90	46	67.8	4.29	
Aledo	84	39	60.8	3.24	
Alexander	86	43	63.2	3.51	
Antioch	85	34	55.9	4.45	
Ashton	83	36	58.0	5.39	
Astoria	86	41	61.6	2.75	
Aurora	86	34	58.6	5.94	
Beardstown	...	...	...	1.84	
Benton	93	...	...	0.84	
Bloomington	90	40	64.2	5.56	
Bushnell	88	39	63.2	3.99	
Cambridge	85	42	62.1	3.25	
Carlinville	92	40	64.8	4.26	
Carrollton	91	42	64.6	6.92	
Charleston	88	44	65.5	4.29	
Chester	93	50	70.0	3.99	
Cisne	92	42	67.4	2.87	
Coatsburg	87	39	64.2	3.04	
Cobden	92	44	69.3	4.34	
Colchester	87	40	62.2	4.12	
Decatur	90	41	63.5	4.54	
Dixon	85	39	59.8	6.15	
Effingham	87	44	65.0	3.77	
Equality	92	45	69.5	4.91	
Flora	91[e]	43[e]	65.4[e]	4.06	
Friendgrove	88	47	66.5	4.15	
Galva	87	39	60.3	3.96	
Grafton	...	...	...	2.98	
Greenville	91	47	65.8	5.07	
Griggsville	89	41	65.0	2.67	
Halfway	90[b]	49[b]	68.0[b]	3.25	
Havana	91	42	64.2	2.69	
Henry	86	38	62.4	3.60	
Hillsboro	93	44	65.4	4.67	
Hoopeston	86	40	62.8	4.53	
Joliet	89	37	60.0	5.42	
Kishwaukee	83	37	58.2	5.51	
Knoxville	83	37	61.3	3.38	
Lagrange	87	34	58.0	5.91	
Laharpe	85	39	61.6	4.55	
Lanark	81	33	58.0	4.06	
Loami	...	...	...	2.85	
McLeansboro	93	47	67.4	3.49	
Martinsville	87	41	63.9	5.41	
Martinton	87	38	62.0	8.93	
Mascoutah	92	44	65.2	4.66	
Mattoon	85	48	67.6	4.98	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Minonk	85	37	61.6	4.54	
Monmouth	86	40	62.3	3.64	
Morrison	82	37	59.6	6.71	
Morrisonville	90	43	64.2	3.17	
Mount Carmel	...	...	...	4.82	
Mount Pulaski	90	44	63.6	3.23	
Mount Vernon	91	42	67.2	3.55	
New Burnside	92	42	68.4	5.59	
Olney	91	44	66.1	3.11	
Ottawa	88	42	61.5	3.68	
Palestine	90	45	67.2	3.67	
Pana	90	40	64.0	3.65	
Paris	86	43	63.8	4.91	
Philo	86	39	62.4	4.62	
Plumhill	89	43	66.6	4.06	
Pontiac	84	42	62.6	6.33	
Rantoul	87	41	62.0	4.01	
Raum	91	48	68.2	6.93	
Riley	84	34	56.9	7.46	
Robinson	87	43	65.4	4.86	
Rockford	84	41	59.8	6.13	
Rushville	86	42	64.4	3.23	
St. Charles	86	33	59.4	7.80	
St. John	94	44	68.6	3.07	
Shobonier	90	42	65.7	1.97	
Streator	87	40	60.6	4.77	
Sullivan	88	40	63.7	4.49	
Sycamore	87	35	58.8	6.59	
Tilden	85	45	66.6	3.09	
Tiskilwa	82	42	60.1	5.10	
Tuscola	87	40	63.0	4.18	
Urbana	85	42	62.6	4.24	
Walnut	87	41	61.7	5.01	
Warsaw	...	...	...	3.21	
Winchester	86	44	61.4	2.21	
Windsor	88	39	64.0	4.40	
Winnebago	84	36	58.4	6.38	
Yorkville	85	35	59.8	5.96	
Zion	82	36	58.4	5.13	
Indiana.					
Anderson	84	38	62 8	5.65	
Angola	84	29	58.4	5.61	
Auburn	84	28	57.8	6.35	
Bedford	95	43	68.2	3.34	
Bloomington	87	45	64.4	5.55	
Bluffton	85	31	60.7	3.98	
Butlerville	86	40	67.8	10.02	
Cambridge City	83	34	60.8	6.64	
Columbus	86	39	64.2	5.84	
Connersville	87	38	64.3	7.49	
Crawfordsville	89[e]	41[e]	63.7[e]	4.34	
Delphi	85	34	61.4	5.48	
Elkhart	85	33	59.4	6.23	
Farmersburg	88	42	65.1	6.42	
Farmland	85	36	61.6	4.33	
Fort Wayne	85	32	60.6	7.44	
Franklin	87	38	69.0	5.65	
Greencastle	85	40	63.2	7.58	
Greenfield	86	38	63.1	5.04	
Greensburg	87	37	64.3	8.84	
Hammond	87	36	59.3	4.79	
Hector	93	34	62.6	3.25	
Holland	89[g]	44[g]	68.6[g]	3.30	
Huntington	83	33	61.2	5.99	
Jeffersonville	90	46	68.6	7.18	
Lafayette	85	39	62.4	3.95	
Laporte	82	32	57.5	7.73	
Logansport	85	36	61.3	5.40	
Madison	90	44	68.1	4.74	
Marengo	89	40	66.4	7.54	
Marion	85	33	61.4	5.18	
Markle	84	30	60.4	6.55	
Mauzy	84[d]	36[d]	63.2[d]	8.40	
Moores Hill	85	37	64.0	8.15	
Mount Vernon	95	51	70.3	4.20	
Northfield	87	33	60.9	4.57	
Paoli	87	43	65.9	5.74	
Princeton	91	45	68.8	4.10	
Rensselaer	83	36	61.4	7.93	
Richmond	85	36	62.3	7.66	
Rochester	82	34	60.8	8.80	
Rockville	86	42	63.2	7.46	
Rome	90	41	68.0	7.60	
Salem	91	40	67.6	4.83	
Scottsburg	89	44	67.8	4.71	
Seymour	86	42	65.0	6.22	
Shelbyville	86	35	63.2	6.56	
South Bend	81	36	58.2	6.46	
Syracuse	84[d]	29[e]	59.0[e]	6.29	
Terre Haute	87	45	67.6	6.23	
Topeka	81	30	59.9	3.66	
Valparaiso	84	31	60.2	7.38	
Veedersburg	...	...	...	5.31	
Vevay	87	43	66.9	7.72	
Vincennes	94	44	67.3	3.76	
Washington	90	44	66.5	4.58	
Winamac	82	32	61.2	7.59	
Worthington	91	43	66.6	4.40	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Indian Territory.	°	°	°	*Ins.*	*Ins.*
Ardmore	88	48	71.5	8.37	
Calvin	...	...	...	12.56	
Durant	87	45	71.0	9.81	
Fairland	87	48	67.5	5.68	
Fort Gibson	...	...	...	11.28	
Goodwater	94	46	73.1	13.10	
Hartshorne	87	49	72.3	7.69	
Healdton	88	40	71.0	7.93	
Holdenville	86	49	71.0	14.19	
Marlow	89	42	70.4	10.90	
Muskogee	86	47	69.5	10.88	
Okmulgee	87	42	69.8	9.10	
Pauls Valley	90	41	70.0	15.05	
Ravia	88	46	71.6	8.57	
Roff	93[h]	52[b]	73.4[g]	12.44	
South McAlester	87	47	71.8	9.30	
Tahlequah	...	...	...	3.48	
Tulsa	...	...	...	8.00	
Vinita	86	44	67.1	10.22	
Wagoner	88	47	69.2	13.88	
Webbers Falls	91	43	71.3	9.01	
Iowa.					
Afton	87	34	60.4	4.76	
Albia	85	38	60.0	4 76	
Algona	80	32	56.1	7.95	
Allerton	84	36	60.3	3.81	
Alta	80	32	55.6	8.74	
Alton	80	33	55.4	8.80	
Amana	83	36	59.8	7.87	
Ames	80	35	58.4	5.51	
Atlantic	84	31	58.4	3.03	
Audubon	83	31	57.8	6.19	
Baxter	82	35	58.2	6.31	
Bedford	79	33	59.1	6.28	
Belleplaine	83	37	59.2	8.28	
Bonaparte	85	38	61.6	2.57	
Boone	80	36	57.6	7.43	
Britt	80	31	55.8	8.10	
Buckingham	...	...	...	5.50	
Burlington	85	40	62.8	3.07	
Carroll	83	31	57.2	6.29	
Cedar Rapids	82	38	60.2	8.31	
Chariton	83	35	59.2	5.51	
Clarinda	81	33	59.7	6.32	
Clinton	87	35	60.6	5.95	
College Springs	82	35	59.2	4.32	
Columbus Junction	84	35	60.8	3.18	
Corning	81	34	59.4	4.31	
Corydon	84	36[b]	60.5[d]	3.84	
Cresco	78	34	55.0	6.60	T.
Creston	79	35	57.9	4.32	
Cumberland	...	...	...	4.94	
Decorah	83	33	56.4	6.48	
Delaware	80	36	57.2	6.13	
Denison	83	26	57.1	5.53	
Desoto	82	35	59.5	3.97	
Dows	79	31	55.8	8.15	
Earlham	80	31	57.2	4.01	
Elkader	84	33	58.4	6.35	
Elliott	87	32	59.6	3.55	
Estherville	79	31	54.6	9.15	
Fayette	80	31	55.1	6.45	
Florence	...	...	...	6.96	
Forest City	80	34	55.8	7.89	
Fort Dodge	82	35[d]	56.5	4.82	
Fort Madison	...	...	...	3.92	
Galva	81	30	55.6	8.05	
Gilman	...	...	...	5.52	
Glenwood	88	32	59.8	3.09	
Grand Meadow	77	36	56 1	8.60	
Greene	81	33	57.3	7.51	
Greenfield	84	32	60.4	4.94	
Grinnell	82	38	59.1	6.35	
Grundy Center	80	33	57.3	6.82	
Guthrie Center	82	33	59.2	4.79	
Hampton	80	35	57.6	8.50	
Hanlontown	79	32	55.2	10.83	
Harlan	82	32	58.0	4.29	
Hopeville	80	35	59.0	4.76	
Humboldt	82	33	55.4	7.04	
Ida Grove	83	32	57.1	6.36	
Independence	78	35	57.4	7.44	
Indianola	82	36	59.5	4.02	
Inwood	82[j]	29[j]	56.5[j]	6.29	
Iowa City	85	37	60.0	5.37	
Iowa Falls	79	33	55.9	7.73	
Keosauqua	87	38	61.5	3.77	
Knoxville	85	37	60.8	5.57	
Lacona	...	...	...	5.43	
Larrabee	84	28	56.2	7.60	T.
Lemars	82	32	56.3	8.87	
Lenox	80	33	59.3	5.42	
Leon	81	37	60.9	5.39	
Little Sioux	85	36	60.0	4.25	
Logan	84	32	58.7	4.26	
Maple Valley	...	...	...	8.22	
Maquoketa	81	34	58.4	5.78	
Marshalltown	82	35	58.3	6.11	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	Ins.	Ins.
Mason City	81	33	56.6	8.19	
Massena	82	33	60.0	4.40	
Monticello	87	32	58.6	5.57	
Montezuma	.....	.....	.....	4.35	
Mountayr	87	35	61.3	6.74	
Mount Pleasant	87	40	62.4	4.01	
Mount Vernon	87	35	59.8	5.41	
New Hampton	79	34	56.6	7.35	
Newton	80	37	58.1	8.25	
Northwood	80	34	56.2	7.89	
Odebolt	83	29	56.8	6.92	
Ogden	80	34	58.9	5.40	
Olin	82	35	59.0	6.37	
Onawa	87	35	61.5	7.57	
Osage	81	34	56.4	7.42	
Oskaloosa	83	39	60.4	3.34	
Pacific Junction	84	33	60.6	2.83	
Perry	82	34	59.4	6.06	
Plover	82	32	56.7	6.60	
Pocahontas	81	33	56.6	8.04	
Redoak	86	35	63.1	3.86	
Ridgeway	82	36	57.4	6.88	
Rock Rapids	80	30	55.4	5.35	
Rockwell City	83	31	57.0	7.05	
Sac City	81	32	56.0	6.55	
St. Charles	82	36	59.2	5.05	
Sheldon	82	31	55.3	8.60	T.
Sibley	81	31	53.2	7.96	
Sidney	86	36	62.0	5.96	
Sigourney	87	38	61.4	3.83	
Sioux Center	79	30	54.6	6.94	
Stockport	83	40	61.6	3.45	
Storm Lake	79	32	54.6	7.50	
Stuart	81	31	59.8	3.99	
Thurman	85	34	61.1	6.20	
Tipton	82	40	61.8	4.08	
Toledo	81	34	58.6	5.90	
Wapello	82	41	61.4	4.23	
Washington	84	39	60.6	4.05	
Washta	85	28	56.6	6.88	
Waterloo	80	35	57.6	5.66	T.
Waukee	85	35	60.4	5.01	
Waverly	79	35	57.0	6.80	
Webster City	82	31	58.2	6.98	
Westbend	80	32	55.9	6.60	
Whitten	81	33	57.8	6.66	
Wilton Junction	88	36	61.2	4.72	
Winterset	81	35	59.8	3.63	
Woodburn	82	34	59.4	6.06	
Zearing	79	31	56.7	6.75	
Kansas.					
Abilene	.....	.....	.....	4.78	
Achilles	92	30	58.0	2.35	
Alton	.....	.....	.....	2.10	
Anthony	.....	.....	.....	3.24	
Atchison	85	38	63.0	3.30	
Baker	84	39	61.9	8.02	
Beloit	.....	.....	.....	3.94	
Blue Rapids	.....	.....	.....	3.28	
Burlington	86	38	65.0	4.98	
Chapman	85	39	63.8	5.17	
Clay Center	85	35	63.0	5.75	
Colby	88	29	56.8	1.72	
Columbus	87	47	66.2	8.98	
Cottonwood Falls	85	37	64.9	5.93	
Cunningham	95	34	63.9	4.73	
Dresden	89	35	59.0	5.91	
Eldorado	86	39	64.6	3.65	
Ellinwood	85	37	63.6	2.37	
Ellsworth	87	34	62.8	5.06	
Emporia	85	41	64.6	6.21	
Englewood	90	39	66.6	1.96	
Enterprise	86	38	63.1	3.53	
Eureka	.....	.....	.....	4.22	
Fall River	89	40	65.7	4.90	
Farnsworth	86	30	59.4	2.06	
Forsha	87	33	64.4	3.79	
Fort Leavenworth	86	43	65.4	4.65	
Fort Scott	89	42	65.0	6.18	
Frankfort	87	33	61.8	4.93	
Garden City	91	33	61.4	1.47	
Gove*1	85	36	56.6	3.17	
Grenola	87	39	64.0	6.71	
Harrison	87	32	60.4	3.80	
Horton	83	36	62.0	6.34	
Hoxie	90	31	59.8	6.85	
Hugoton	91	34	61.2	1.37	
Hutchinson	87	36	64.1	3.86	
Independence	92	47	67.9	6.80	
Iola	.....	.....	.....	4.02	
Jewell	87	34	62.2	3.94	
La Crosse	86[j]	38[k]	62.7[k]	2.68	
Lakin	89	32	60.4	2.40	
Larned	83	32	59.5	3.34	
Lawrence	86	43	65.6	5.29	
Lebo	88	42	65.3	3.63	
Lindsborg	.....	.....	.....	4.15	
Macksville	86	34	61.4	4.92	
Kansas—Cont'd.	°	°	°	Ins.	Ins.
McPherson	86	38	63.4	5.91	
Madison	86	37	64.7	5.26	
Manhattan *b*	89	38	65.2	6.01	
Manhattan *c*	88	36	63.1	5.73	
Marion	85	.....	.....	2.50	
Medicine Lodge	91	40	67.4	2.88	
Minneapolis	85	37	63.1	6.79	
Moran	87	45	65.6	5.37	
Mounthope	83	44	64.8	3.86	
Neosho Rapids	.....	.....	.....	3.22	
Ness City	90[k]	37[k]	63.3[k]	3.65	
Newton	85	38	64.0	3.37	
Norton	88	32	59.0	6.18	
Norwich	86	40	65.4	3.25	
Oberlin	.....	.....	.....	2.83	
Osage City	88	39	63.8	4.11	
Osborne	.....	.....	.....	3.75	
Oswego	85	46	66.1	8.82	
Ottawa	87	37	64.5	4.68	
Phillipsburg	89	36	60.7	4.44	
Pittsburg	89	42	67.2	6.96	
Plainville	81	37	60.2	3.83	
Pleasanton	86	42	66.0	7.57	
Pratt	91	37	64.0	3.75	
Republic	87	36	62.0	5.43	
Rome	92	40	66.4	3.41	
Russell	86	36	61.5	4.41	
Salina	84	38	63.4	3.25	
Sedan	88	45	66.6	5.61	
Toronto	91	38	64.8	5.34	
Ulysses	90	33	59.0	1.49	
Valley Falls	84	37	61.8	4.95	
Viroqua	89	35	61.4	2.55	
Wakeèney	88	35	61.2	3.78	
Wakeeney (near)	.....	.....	.....	4.06	
Wallace	86	30	57.8	8.11	
Walnut	87	47	66.2	4.73	
Wamego*1	83	44	63.5	4.94	
Winfield	88	43	65.1	4.62	
Kentucky.					
Alpha	88	43	69.6	3.23	
Anchorage	89	40	66.6	6.38	
Bardstown	93	44	69.7	3.23	
Beattyville	94	39	67.1	2.70	
Beaver Dam	89	43	68.2	7.43	
Berea	90	41	68.6	5.27	
Blandville	89	50	69.0	5.50	
Bowling Green	93	45	70.8	3.39	
Burnside	90	42	68.5	4.40	
Cadiz	91	45	70.4	5.98	
Calhoun	91	46	70.8	5.41	
Catlettsburg	90	43	66.5	7.12	
Earlington	90	40[f]	68.6[e]	6.07	
Edmonton	88	41	68.7	4.31	
Eubank	88	41	66.1	3.65	
Falmouth	.....	.....	.....	7.20	
Frankfort	88	45	67.5	4.04	
Greensburg	91	42	68.4	3.81	
High Bridge	89	44	67.8	3.39	
Hopkinsville	89	43	69.0	7.22	
Irvington	89	48	69.0	5.55	
Jackson	95	40	68.6	5.56	
Leitchfield	88	48	67.6	6.65	
Loretto	90	41	68.6	2.09	
Manchester	91	42	68.6	3.60	
Marion	89	49	68.6	5.53	
Mayfield	90	47	69.6	6.46	
Maysville	92	41	66.6	8.10	
Middlesboro	87[g]	45[g]	68.9[g]	4.29	
Mount Sterling	91	43	67.6	7.43	
Owensboro	90	47	68.8	6.04	
Owenton	95	42	68.2	7.97	
Paducah	93	51	71.4	5.57	
Princeton	91	48	70.5	3.74	
Richmond	89	43	68.3	3.47	
St. John	88	46	67.0	5.74	
Scott	87	40	65.4	8.17	
Shelby City	89	41	66.6	3.15	
Shelbyville	95	41	68.5	4.29	
Taylorsville	90	40	67.9	5.18	
West Liberty [h]	91	38	66.6	.....	
Williamsburg	90	40	67.8	4.63	
Williamstown	85	40	64.4	7.13	
Louisiana.					
Abbeville	98	60	78.8	4.53	
Alexandria	99	56	78.2	6.63	
Amite	94	57	77.5	9.68	
Baton Rouge	97	57	78.2	7.04	
Burnside	93	59	77.2	5.80	
Calhoun	.....	.....	.....	5.52	
Cameron	91	62	78.4	2.74	
Caspiana	93	51	76.5	6.33	
Cheneyville	92	51	77.0	6.56	
Clinton	90	58	76.2	7.90	
Collinston	94	55	75.8	6.21	
Covington	92	57	77.3	5.37	
Donaldsonville	98	61	80.0	7.23	
Emilie	92	60	77.6	5.15	
Louisiana—Cont'd.	°	°	°	Ins.	Ins.
Farmerville	90	55	76.4	4.42	
Franklin	95	62	79.3	6.52	
Georgetown	91	54	75.8	3.39	
Grand Coteau	94	60	78.0	7.46	
Hammond	93	58	76.8	6.91	
Houma	94	56	78.2	3.83	
Jennings	91	59	77.4	4.68	
Lafayette	93	61	77.6	5.04	
Lake Charles	93	59	77.3	5.18	
Lawrence	93	63	79.1	5.84	
Lakeside	92	61	78.0	1.06	
Libertyhill	94	51	76.3	2.94	
Logansport	.....	.....	.....	4.89	
Mansfield	92	52	76.4	2.86	
Melville	92	57	77.0	7.63	
Minden	99	53	75.9	4.57	
Monroe	95	55	76.2	4.62	
Morgan City	.....	.....	.....	2.60	
New Iberia	89	60	77.3	4.75	
Opelousas	95	59	77.9	9.44	
Plain Dealing	91	51	74.8	8.30	
Port Eads	90	67	78.3	0.65	
Rayne	94	60	78.0	4.01	
Reserve	96	62	78.9	7.53	
Robeline	93	54	75.5	5.61	
Ruston	95	48	75.6[e]	4.92	
St. Francisville	92	60	79.2	5.92	
Schriever	95	52[a]	78.2[b]	7.43	
Simmesport	.....	.....	.....	6.50	
Southern University	.....	.....	.....	4.98	
Sugar Experiment Station	94	60	78.6	2.89	
Sugartown	91	56	77.2	7.24	
Maine.					
Bar Harbor	76	32	50.9	3.20	T.
Chesuncook	.....	.....	.....	2.42	
Cornish	82	33	54.2	2.15	T.
Danforth	.....	.....	.....	2.23	
Fairfield	81	33	54.0	2.22	
Farmington	82	28	53.1	2.65	T.
Gardiner	83	33	53.6	2.17	
Houlton	80	22	50.6	2.00	
Lewiston	82	35	54.6	2.04	
Madison	78	30	52.2	3.73	
Mayfield	74	30	50.1	3.29	T.
Millinocket	80	27	51.4	2.91	
North Bridgton	81	33	53.8	2.16	T.
Oquossoc	76	26	48.1	3.63	T.
Orono	79	30	52.9	3.47	
Patten	79	25	50.4	2.15	
Rumford Falls	78	32	53.3	2.33	T.
The Forks	.....	.....	.....	3.58	.....
Thomaston	77	28	50.5	2.43	
Vanburen	80	22	48.8	3.26	T.
Winslow	82	31	54.2	2.53	T.
Maryland.					
Annapolis	88	45	66.2	3.58	
Bachmans Valley	85	34	62.4	0.70	
Boettcherville	97	30	66.8	2.27	
Cambridge	91	40	67.7	3.55	
Cheltenham	87	38	64.6	3.46	
Chestertown	85	42	64.0	2.15	
Chewsville	87	32	63.2	2.43	
Clearspring	88	38	63.1	1.70	
Coleman	86	41	65.6	2.85	
Collegepark	90	33	63.8	3.14	
Colora	.....	.....	.....	2.59	
Cumberland	.....	.....	.....	1.45	
Darlington	86	37	62.9	3.35	
Deerpark	85[f]	25[f]	56.8[f]	4.58	
Denton	89	39	66.3	3.98	
Easton	85	39	64.9	4.51	
Fallston	84	38	62.7	3.15	
Frederick	88	37	66.5	2.36	
Grantsville	85	27	58.0	2.18	
Greatfalls	89	35	65.9	3.30	
Greenspring Furnace	.....	.....	.....	2.52	
Hancock	94	34	65.4	1.17	
Harney	.....	.....	.....	2.38	
Jewell	85	43	65.8	3.01	
Johns Hopkins Hospital	87	46	66.6	1.75	
Keedysville	93	35	66.0	2.30	
Laurel	90	45	67.4	4.71	
Mount St. Marys College	86	40	64.2	1.90	
New Market	87	38	65.0	2.92	
Oakland	85	25	58.3	4.28	
Pocomoke City	87	42	66.7	2.54	
Pórto Bello	88	44	66.8	3.65	
Prince Fredericktown	91	40	66.4	3.97	
Princess Anne	86	38	64.6	3.37	
Solomons	88	46	66.5	6.12	
Sudlersville	89	40	66.4	3.79	
Takoma Park	88	38	64.2	4.22	
Van Bibber	84	40	64.9	2.64	
Westernport	88	34	62.7	2.33	
Woodstock	85	38	66.4	2.50	
Massachusetts.					
Bedford	82	32	56.4	0.91	T.
Bluehill (summit)	81	32	55.8	1.63	T.

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cambridge	83	33	57.4	1.53	
Chestnuthill	85	32	57.9	1.65	
Concord	82	29	55.3	0.93	
East Templeton *[1]	80	34	57.2	0.61	T.
Fall River	78	35	55.4	1.24	
Fitchburg	82	32	56.6	1.35	
Framingham	83	29	58.0	1.23	
Groton	81	30	55.2	1.25	
Hyannis	.....	.....	.....	1.75	
Jefferson	.....	.....	.....	0.82	T.
Lawrence	84	33	56.0	1.20	T.
Leominster	.....	.....	.....	1.08	T.
Lowell	82	35	58.5	1.29	
Middleboro	83	29	56.2	1.29	
Monson	80	32	56.4	1.16	
New Bedford	77	36	55.3	1.65	
Plymouth *[1]	82	39	52.9	1.11	
Princeton	.....	.....	.....	1.01	
Provincetown	82	33	55.0	1.04	
Salem	.....	.....	.....	1.59	
Somerset *[1]	86	33	59.3	1.80	
Sterling	.....	.....	.....	0.81	
Taunton	82	32	56.4	1.22	
Webster	.....	.....	.....	1.01	
Westboro	84	30	57.4	1.22	T.
Weston	82	30	55.8	2.15	
Williamstown	77	32	56.1	1.19	T.
Winchendon	.....	.....	.....	0.89	
Worcester	81	34	57.5	1.07	
Michigan.					
Adrian	88	27	57.8	4.93	
Agricultural College	82	30	56.7	5.17	
Allegan	76[i]	31[i]	54.7[i]	6.45	
Alma	83	25	55.6	6.27	
Ann Arbor	82	26	57.6	4.93	
Arbela	84	25	56.6	5.19	
Baldwin	85	20	55.2	2.19	
Ball Mountain	80	27	55.6	5.05	
Bay City	82	31	55.8	6.37	
Benzonia	81	22	50.8	3.35	
Berlin	81	24	55.6	4.07	
Big Rapids	78	20	52.9	6.76	
Birmingham	81	27	56.5	3.52	
Bloomingdale	85	27	57.3	4.96	
Calumet	75	31	47.2	3.34	3.0
Cassopolis	82	29	60.8	8.10	
Charlevoix	78	33	50.7	2.02	
Charlotte	87	25	57.6	3.79	
Chatham	75	21	46.0	3.51	
Cheboygan	75	22	49.8	2.86	
Clinton	86	26	57.7	5.16	
Concord	83	26	56.9	6.92	
Deer Park	70	26	44.0	10.50	
Detour	69	27	47.5	3.52	
Dundee	87	26	58.0	4.69	
Eagle Harbor	76	30	44.7	2.74	
East Tawas	69[e]	30[e]	51.8[e]	5.68	
Eloise	83	27	57.9	.....	
Ewen	73	15	47.7	2.64	
Fennville	84	28	55.5	5.56	
Fitchburg	85	24	55.9	6.37	
Flint	85	25	56.1	6.22	
Frankfort	75[d]	25[f]	50.0[e]	.....	
Gladwin	82	23	54.6	9.90	
Grand Haven	77	30	52.8	5.53	
Grand Marais	68	30	44.0	2.66	T.
Grape	83	27	57.8	4.69	
Grayling	76	20	51.9	4.70	
Hagar	85	28	55.5	9.99	
Harbor Beach	.....	.....	.....	6.80	
Harrison	79	23	54.4	4.45	
Harrisville	74	25	49.8	3.64	
Hart	.....	.....	.....	2.75	
Hastings	84	25	56.8	6.60	
Hayes	82	30	55.6	6.98	
Highland	.....	.....	.....	6.67	
Hillsdale	86	25	57.6	6.02	
Howell	85	22	56.2	4.61	
Humboldt	75	16	43.4	2.30	
Iron Mountain	77	20	50.6	2.58	
Iron River	77	15	48.5	5.00	
Ironwood	75	26	49.8	2.07	T.
Ivan	78	19	52.2	3.71	
Jackson	85	28	59.2	6.12	
Jeddo	81	26	55.1	3.98	
Kalamazoo	81	29	57.9	5.61	
Lake City	.....	.....	.....	2.81	
Lansing	84	27	56.8	5.51	
Lapeer	85	27	.....	.....	
Ludington	75	26	50.8	2.86	
Mackinaw City	73[g]	30	49.0[d]	.....	
Mancelona	77	14	49.4	0.93	
Marine City	80	23	55.0	3.32	
Menominee	73	30	49.4	2.43	
Midland	83	25	56.4	7.75	
Montague	83	26	53.4	4.61	
Muskegon	83	27	55.0	5.72	
Old Mission	79	25	51.1	2.36	
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Olivet	80	29	56.7	5.66	
Omer	.....	.....	.....	4.87	
Onaway	76	24	50.8	1.72	
Ovid	85	25	55.8	5.88	
Owosso	89[d]	23[d]	56.8[d]	4.05	
Petoskey	74	26	48.2	2.55	T.
Plymouth	86	19	56.7	4.25	
Port Austin	79[e]	32[e]	54.0[e]	3.45	
Powers	87	19	50.4	.....	
Reed City	79	22	52.2	5.97	
Saginaw (W. S.)	85	25	57.2	7.94	
St. Ignace	69	24	46.8	.....	
St. Johns	88	26	57.4	5.46	
Slocum	79	24	53.8	5.70	
Somerset	82	24	56.0	.....	
South Haven	92	27	52.5	7.16	
Stanton	83	21	55.4	2.11	
Thomaston	75	17	48.6	2.64	
Thornville	83	27	58.2	4.48	
Traverse City	75[j]	29[h]	50.0[f]	3.19	
Vassar	82	28	56.9	4.95	
Wasepi	82	27	57.0	7.41	
Waverly	80[f]	27[d]	55.2[e]	.....	
Webberville	85	26	56.2	4.36	
West Branch	.....	.....	.....	1.20	
Wetmore	79	17	45.0	3.30	
Whitefish Point	68	28	43.2	3.78	
Ypsilanti	83	30	56.4	5.49	
Minnesota.					
Albert Lea	80	32	55.8	7.98	T.
Alexandria	79	31	52.0	5.12	
Amboy	80[e]	21[e]	56.2[e]	7.38	
Angus	82	27	50.0	4.54	
Ashby	78	27	50.6	6.15	
Beardsley	.....	.....	.....	7.44	
Beaulieu	79	32	51.2	4.79	T.
Bemidji	83	26	51.8	5.59	
Bird Island	80	33	54.2	3.46	
Caledonia	81	33	54.2	7.11	
Campbell	80	31	51.4	5.42	
Collegeville	76	32	52.1	3.99	T.
Crookston	83	32	51.4	5.82	
Detroit	79	27	48.9	5.41	T.
Faribault	81	30	54.8	4.82	
Farmington	78	32	54.7	5.48	1.0
Fergus Falls	79	31	51.8	5.83	0.3
Glencoe	75	32	53.4	5.65	T.
Grand Meadow	81	30	55.2	8.26	
Hallock	83	27	50.4	4.50	
Hinckley	79	28	51.4	2.64	
Hovland	78	24	45.4	2.44	
Lake Winnibigoshish	80	27	50.0	4.30	
Leech	76	25	48.6	6.01	T.
Long Prairie	78	27	50.8	4.60	
Luverne	77	32	52.8	5.32	
Lynd	79	33	53.0	6.74	
Mankato	.....	.....	.....	4.86	
Mapleplain	80	32	53.8	4.28	0.3
Milan	79	33	52.6	5.80	
Montevideo	80	33	53.9	4.13	
Mora	78	26	50.4	4.50	
Morris	77	32	51.8	4.97	
Mount Iron	78	22	48.6	3.70	
New London	80	32	51.5	4.14	
New Richland	79	32	56.2	6.62	
New Ulm	82	31	55.6	7.88	T.
Park Rapids	78	27	49.2	5.05	T.
Peterson	.....	.....	.....	6.48	
Pine River	80	11	48.9	6.38	
Pipestone	80	33	53.0		
Pokegama Falls	78	24	49.8	4.53	
Pratt	78	31	55.0	7.78	
Redwing	77[d]	35[d]	56.6[d]	5.46	
Reeds	.....	.....	.....	5.74	
Rolling Green	76	35	55.6	8.31	
St. Charles	79	31	53.7	7.69	
St. Cloud	77	32	54.4	5.47	T.
St. Peter	77	28	55.4	4.69	
Sandy Lake Dam	78	28	49.2	3.83	
Shakopee	76	33	55.2	4.86	
Stillwater	.....	.....	.....	3.08	
Tonka	.....	.....	.....	4.59	
Wabasha	82	34	56.8	5.86	
Wadena	78	31	50.0	5.98	
Winnebago	80	33	56.2	7.27	
Winona	83	35	54.9	7.89	
Worthington	80	32	53.4	7.06	
Zumbrota	79	24	55.0	5.93	.....
Mississippi.					
Aberdeen	96	49	74.2	4.20	
Agricultural College	94	47	71.8	4.40	
Austin	92	47	72.4	7.40	
Batesville	93	52	73.2	8.64	
Bay St. Louis	90	57	77.6	5.84	
Biloxi	92	60	79.0	6.88	
Booneville	89	49	71.6	4.51	
Brookhaven	96	54	76.6	4.70	
Canton	92	50	75.2	4.16	
Mississippi—Cont'd.	°	°	°	*Ins.*	*Ins.*
Columbia	96	55	77.8	3.92	
Columbus	96	50	74.6	3.34	
Corinth	88	51	70.4	3.90	
Crystal Springs	94	53	75.8	3.87	
Duck Hill	92	46	73.9	6.66	
Edwards	91	52	74.4	4.03	
Enterprise	.....	.....	.....	3.79	
Fayette	90	54	75.0	4.05	
Fayette (near)	.....	.....	.....	4.70	
Greenville *a*	93	52	75.6	6.32	
Greenville *b*	93	53	75.0	6.45	
Greenwood	93	51	73.8	8.86	
Hattiesburg	.....	.....	.....	4.98	
Hazlehurst	94	55	76.2	3.10	
Hernando	89	50	71.1	5.50	
Holly Springs	90	53	71.4	4.70	
Indianola	89	52	73.9	9.67	
Jackson	93	51	75.8	3.15	
Kosciusko	93	49	74.4	5.27	
Lake	96	41	74.9	3.60	
Lake Como	98	51	75.8	3.23	
Laurel	98	52	76.8	4.09	
Leakesville	96	54	76.8	5.09	
Leland	.....	.....	.....	8.41	
Louisville	90	52	73.8	4.96	
Macon	97	52	76.8	.....	
McNeill	96[i]	57	78.5[f]	6.36	
Magee	93[d]	51[d]	74.4[d]	3.68	
Magnolia	95	55	77.6	6.73	
Merrill	.....	.....	.....	5.42	
Natchez	94	58	78.4	4.83	
Nitta Yuma	95	51	75.9	2.96	
Okolona	96	41	74.1	3.20	
Patmos	.....	.....	.....	3.82	
Pearlington	94	57	75.4	4.66	
Pecan	96	60	78.2	9.95	
Pittsboro	94	49	73.2	5.77	
Pontotoc	89	48	72.0	4.13	
Pearl River	92	57	76.3	3.45	
Port Gibson	94	50	75.6	3.79	
Porterville	94	50	74.5	5.08	
Quitman	94	52	75.8	3.90	
Ripley	92	43	70.4	10.50	
Shelby	95	47	74.5	9.27	
Shubuta	.....	.....	.....	3.30	
Stonington	.....	.....	.....	3.76	
Suffolk	93	53	76.1	6.19	
Tchula	93	52	75.3	4.80	
Tupelo	95	47	73.0	5.32	
University	92	51	72.2	6.61	
Walnutgrove	90	50	74.5	3.42	
Watervalley	93	50	71.0	9.38	
Waynesboro	94	52	76.6	3.42	
Woodville	93	56	77.2	7.24	
Yazoo City	95	52	75.6	3.86	
Missouri.					
Albany	.....	.....	.....	4.01	
Appleton City	85	42	65.7	7.43	
Arlington	.....	.....	.....	4.00	
Arthur	86	40	65.2	9.97	
Avalon	87	38	62.5	4.08	
Bagnell	.....	.....	.....	6.99	
Bethany	84	37	60.7	4.80	
Birchtree	88	51	67.1	4.99	
Blue Springs	85[e]	37[e]	63.4[e]	4.18	
Boonville	.....	.....	.....	3.74	
Bourbon	89	44	67.0	3.76	
Brunswick	89	40	63.9	3.00	
Cape Girardeau	.....	.....	.....	5.64	
Caruthersville	93	45	71.0	9.86	
Conception	81	38	61.6	2.64	
Darksville	88	39	63.6	3.59	
Dean	89	44	67.0	12.03	
De Soto	93	40	66.2	4.87	
Doniphan	89	44	68.6	5.85	
Downing	.....	.....	.....	6.32	
Eldorado Springs	87	45	65.8	5.63	
Fairport	.....	.....	.....	4.21	
Fayette	86	38	62.8	8.11	
Fulton	89	40	64.6	3.31	
Gallatin *[1]	84	42	64.2	8.34	
Gano	90	43	66.8	4.64	
Glasgow	86	41	64.6	2.83	
Goodland	88	39	65.0	4.41	
Gorin	.....	.....	.....	4.06	
Grant City	84	37	61.1	4.82	
Harrisonville	87	41	64.6	5.19	
Hazlehurst	.....	.....	.....	5.30	
Hermann	.....	.....	.....	3.38	
Houston	89	42	66.1	5.61	
Huntsville	88	41	65.4	2.81	
Ironton	91	40	66.9	4.85	
Jackson	92	44	67.8	4.38	
Jefferson City	88	45	65.4	4.54	
Joplin	86	50	67.6	8.17	
Kidder	85	40	61.8	6.28	
Koshkonong	88	48	66.9	6.96	
Lamar	88	48	66.0	8.70	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Missouri*—Cont'd.**					
Lamonte				4.24	
Lebanon	89	46	63.4	5.24	
Lexington	87	40	64.8	4.57	
Liberty	86	41	63.8	4.28	
Lockwood	84	46	64.6	7.34	
Louisiana	90	38	63.4	2.51	
Macon	89	41	64.6	3.07	
Marblehill	92[e]	43[e]	68.4[e]	3.54	
Marshall	88	38	64.4	1.74	
Maryville	89	36	61.4	5.52	
Mexico	90	41	65.0	2.29	
Monroe	87	40	63.0	2.41	
Montreal	88	42	66.0	5.30	
Mountaingrove	86	41	64.6	6.21	
Mount Vernon	90	44	66.4	9.63	
Neosho	87	44	66.6	9.83	
New Haven	92	47	67.0	3.87	
New Madrid				8.69	
New Palestine	89	44	65.3	3.48	
Oakfield	92	48	67.1	3.37	
Olden	91	44	67.4	7.40	
Oregon	85	34	62.2	3.93	
Osceola				6.35	
Pine Hill				3.21	
Princeton	89	40	63.4	5.08	
Protem	91	46	67.2	8.85	
Rockport				5.78	
Rolla				4.81	
St. Charles	92	46	66.2	3.06	
St. Joseph				4.90	
Sarcoxie				11.42	
Sedalia	87	43	65.4	5.31	
Seymour	88	46	64.6	8.37	
Sikeston	89	46	68.6	6.33	
Steffenville	87	42	63.4	3.85	
Sublett	84	40	62.0	6.70	
Trenton	85	42	63.4	4.66	
Unionville	86	38	61.4	5.99	
Versailles	92	42	66.6	5.58	
Warrensburg	89	41	66.3	3.50	
Warrenton	90	42	65.2	4.51	
Warsaw	88	39	65.3	7.18	
Wheatland				7.21	
Willowsprings	85	40	64.7	5.66	
Windsor	86	40	65.1	4.57	
Zeitonia	94	40	68.0	2.46	
Montana.					
Absarokee				8.42	5.5
Adel	79	20	45.3	1.84	
Alzada				0.40	
Anaconda	80	27	47.0		
Augusta	78	26	46.6	1.52	
Billings	85	28	53.0	3.86	
Boulder	74	25	47.4	1.11	1.8
Bozeman	71	26	45.2	3.23	2.4
Butte	72	27	46.0	2.05	1.8
Canyon Ferry	81	25	50.7	1.83	
Cascade	82	28	51.3	2.30	T.
Chinook	88[b]	30[b]	53.2[b]		
Choteau	81	25	47.2	1.45	2.0
Clearcreek	81	29	49.1	1.07	T.
Columbia Falls	83	20	49.4	3.13	
Copper				2.75	
Crow Agency	82	26	52.0	2.72	
Culbertson	83	17	49.6	1.21	T.
Dayton	83	36	55.5	2.56	T.
Decker	83	27	51.2	1.85	
Deerlodge		10	47.6[e]		
Dillon	78	26	48.0	3.17	4.0
Ekalaka	81	18	49.4	1.40	
Fallon	87	20	52.8	0.76	T.
Forsyth	88	26	52.6	1.83	
Fort Benton	76	31	49.2	0.91	
Fort Harrison	74	28	48.6		
Fort Logan	75	20	41.2		
Glendive	88	19	49.6	2.35	
Gold Butte				2.10	5.0
Grayling	69[b]	17[b]	42.0[b]	2.58	
Greatfalls	78	31	50.6	1.99	T.
Hamilton	85	30	54.2	0.84	T.
Harlem	84	19	50.2	1.56	
Hayden (near)	83	26	50.4	2.00	
Highwood				2.00	T.
Homepark				2.25	
Lakeview				2.80	
Lame Deer	85	20	49.8	1.01	
Lewistown	79	24	48.6	2.15	T.
Livingston	78	26	48.2	3.05	3.0
Lodgegrass	83	24	51.4	2.92	
Marysville[d]	72	25	43.4		
Nye				7.15	25.5
Ovando	78	21	46.9	1.18	T.
Parrot	75	27	49.3	2.18	T.
Philipsburg	84	24	47.2	3.02	T.
Plains	81	26	50.0	1.48	
Poplar	84	21	51.8	1.57	T.
Raymond				1.89	
Redlodge	70	8	42.2	8.29	50.0
***Montana*—Cont'd.**					
Ridgelawn	85	25	53.1	2.07	T.
St. Pauls	81	23	46.4	2.71	
St. Peter	74	26	45.8	2.97	11.0
Saltese				1.85	5.0
Springbrook	84	11	50.4	2.05	T.
Steele	79	29	50.4	2.22	T.
Toston	83	30	50.4	1.43	
Townsend				1.13	
Troy	89	27	52.0	2.27	
Twin Bridges	84	18	48.4	2.50	
Utica	75	25	46.1	1.97	4.0
Virginia City	73[e]	22[d]	44.2[e]	2.12	1.5
Warrick				1.03	5.9
Whitlash				1.27	T.
Wolf Creek	77	26	47.8	2.44	1.0
Wolf Point				1.56	
Wolsey	73	12	40.4	1.63	8.0
Yale	74	20	46.2	1.81	1.0
Nebraska.					
Agate	80	23	49.2	3.16	2.4
Agee*[1]	86	32	53.3	8.30	
Albion	87	30	56.6	8.89	
Alliance				5.34	
Alma	91	33	60.5	4.46	
Ansley	84	30	58.0	6.85	
Arapaho				4.58	
Arcadia				6.60	
Ashland	85	34	61.1	3.77	
Ashton				5.78	
Auburn	86	33	59.6	5.36	
Aurora	89	32	58.7	4.94	
Bartley	92	33	59.4	5.22	T.
Beaver	89	34	59.2	4.94	
Bellevue				3.43	
Benkleman				3.20	
Bethany				6.14	
Blair	85	35	58.5	4.73	
Bluehill				7.17	
Bradshaw				5.97	
Bridgeport	85	26	52.8	5.59	T.
Broken Bow	83	28	54.9	5.73	
Burchard				2.80	
Burge				5.98	2.2
Burwell				5.73	
Callaway	88	26	56.0	7.70	
Central City				7.64	
Chester				3.57	
Cody				5.32	
Columbus	85	34	58.4	8.61	
Crawford				5.10	5.0
Crete	85	34	61.4	6.69	
Culbertson	88	36	60.0	4.15	
Curtis	88	35	56.2	5.73	
David City	84	32	57.7	7.88	
Dawson	85	34	61.7	2.72	
Duff				4.65	3.0
Edgar				8.70	
Endicott				4.06	
Ericson				7.90	
Ewing				7.28	
Fairbury	90	32	60.8	6.99	
Fairmont	86	31	58.0	6.02	
Fort Robinson	72	25	49.2	4.11	T.
Franklin	87	32	58.8	3.83	
Fremont	85	34	59.1	4.80	
Fullerton				8.65	
Geneva	86	34	59.6	7.39	
Genoa (near)	87	32	58.6	11.45	
Gering	84	28	53.6	4.57	
Gordon				6.87	3.5
Gothenburg	89	29	56.4	4.94	
Grand Island	90	38	59.9	9.53	
Grant	85	28	54.0	4.04	
Guide Rock				6.57	
Halsey	82	27	53.6	5.33	
Hartington	82	28	54.4	8.80	
Harvard	84	30	57.0	6.53	
Hastings*[1]	85	42	58.9	7.50	
Hayes Center				4.92	1.0
Hay Springs	82	24	49.9	5.04	9.0
Hebron	88	35	60.8	3.99	
Hendley				4.91	
Hickman				7.33	
Holbrook				5.51	
Holdrege	88	30	58.9	6.86	
Holly				7.80	
Hooper*[1]	84	40	59.2	4.28	
Imperial	79[c]	32	54.5[b]	5.65	
Johnstown				3.04	0.5
Kearney	88	30	58.5	8.69	
Kennedy	82	29	53.6	5.30	7.0
Kimball	86	28	52.0	4.04	
Kirkwood	80	27	53.8	4.48	
Leavitt	87	32	58.8	4.45	
Level				4.44	
Lexington	86	29	55.6	4.05	
Lodgepole	80	28	52.1	4.70	
Loup	86	29	57.6	5.55	T.
***Nebraska*—Cont'd.**					
Lynch	84	30	56.8	5.79	
McCook				4.99	
McCool				6.50	
Madison	82	31	56.0	9.56	
Marquette				6.51	
Mason				7.00	
Minden	86	33	56.5	7.19	
Monroe				8.79	
Nebraska City	85	27	59.0	6.55	
Nemaha				2.70	
Norfolk	88	32	57.4	9.88	
North Loup	86	31	56.3	7.04	T.
Oakdale	81	32	55.9	8.36	0.1
Odell				2.38	
Ord				6.20	
Osceola				7.06	
Palmer				8.93	
Palmyra*[1]	86	42	61.0	5.50	
Pawnee City	89	33	61.0	2.34	
Plattsmouth		40		5.30	
Plymouth	86	33	61.5	5.01	
Purdum	80	29	53.1	5.27	2.0
Ravenna	87	30	57.0	6.94	
Redcloud	84[c]	34[b]	58.0[c]	5.33	
Republican				5.10	
Rulo				3.11	
St. Libory				11.22	
St. Paul	87	32	58.8	7.70	
Santee	81	31	55.6	4.65	
Schuyler				6.08	
Seward	85	36	58.3	4.12	
Smithfield				5.97	
Springview	80	29	53.2	4.43	
Stanton	85	31	56.3	10.02	
Strang				8.57	
Stratton				4.23	
Stromsburg				6.39	
Superior				3.34	
Syracuse				5.08	
Tablerock				3.59	
Tecumseh	86	31	60.1	4.09	
Tekamah	87	35	58.9	4.76	
Turlington	85	33	60.8	4.99	
University Farm	85	35	60.7	4.72	
Wahoo				4.07	
Wakefield	84	32	56.2	8.64	
Wallace				4.92	
Wauneta				3.35	
Weeping Water				2.84	
Westpoint	85	32	57.8	7.15	
Whitman				5.68	3.5
Wilber				5.30	
Wilsonville				5.66	
Winnebago	88	30	56.4	7.19	
Wisner				9.52	
York	86	32	61.6	5.13	
Nevada.					
Amos	90	18	51.6	0.63	
Austin	79	21	47.4	0.99	
Battle Mountain				0.12	
Belmont	73	19	46.0	1.13	8.0
Beowawe*[1]	79	35	52.4	T.	T.
Carlin*[1]	83	35	52.4		
Carson City	83	23	49.7	1.09	2.5
Cranes Ranch				2.21	
Dyer	83	25	51.4	0.90	
Elko				2.57	3.5
Eureka	75	19	43.4	1.10	3.0
Geyser	82	20	46.5	0.50	0.5
Golconda				1.15	
Halleck*[5]	78	32	50.4	3.21	
Hazen	80	35	56.2	0.96	
Humboldt	79	34	55.6	0.01	
Lewers Ranch	84	25	51.2	2.35	3.0
Lovelocks	87	30	53.2	0.00	
Martins	93	24	55.6	0.82	T.
Mill City*[1]	70	32	48.0	0.50	
Morey	76	17	46.2	2.45	10.5
Palisade	85	28	50.8	1.60	
Palmetto	78	19	46.0	2.05	15.0
Pioche	89	14	49.4	1.50	T.
Potts	80	21	47.2	0.85	9.5
Reno State University	79	29	50.4	0.71	3.5
San Jacinto	82	25	48.8	1.37	
Sodaville	94	31	57.0	1.00	
Tecoma	84	27	50.0	2.91	
Wabuska	86	22	53.4	1.15	
Wadsworth	89	30	55.6		
Wells*[1]	67	28	41.6	1.15	
Wood	82	22	47.7	2.95	
New Hampshire.					
Alstead	85	24	57.2		
Bartlett				1.82	
Berlin Mills	80	24	52.3	2.79	1.0
Bethlehem	77	26	52.0	2.91	1.5
Bretton Woods				3.30	
Brookline*[1]	82	32	58.3	1.08	T.
Durham	82	26	54.2	0.95	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
New Hampshire—Cont'd.					
Grafton	79	26	52.8	1.98	T.
Hanover	79	28	54.6	2.03	T.
Keene	84	25	55.8	1.48	T.
Nashua	85	32	57.8	0.82	
Newton	82	27	53.9	1.37	T.
North Woodstock	.....	.....	.....	3.75	
Plymouth	84	28	55.1	1.66	T.
Stratford	80	26	51.9	2.73	2.0
New Jersey.					
Asbury Park	84	36	57.2	0.95	
Bayonne	82	35	60.7	1.11	
Belvidere	88	30	62.5	0.87	
Bergen Point	83	34	60.3	1.50	
Beverly	84	34	62.5	2.09	
Bridgeton	89	38	65.6	3.76	
Browns Mills	86	32	63.3	0.72	
Canton	.....	.....	.....	3.94	
Cape May C. H.	85	38	61.8	3.71	
Charlotteburg	83	30	58.5	1.48	
Chester	83	30	59.4	1.39	
Clayton	85[d]	32[d]	62.4[d]	1.56	
College Farm	84	31	61.2	1.83	
Dover	83	30	59.0	1.34	
Elizabeth	88	35	63.5	2.06	
Englewood	83	36	60.6	1.06	
Flemington	86	29	62.0	0.64	
Friesburg	86	35	63.2	1.85	
Hightstown	86	32	59.5	3.00	
Imlaystown	84	34	62.7	1.55	
Indian Mills	87	30	63.4	1.51	
Lakewood	88	32	61.6	0.59	
Lambertville	86	32	63.4	1.13	
Layton	85	22	59.1	1.56	
Moorestown	84	34	62.2	1.31	
Newark	82	35	61.0	1.25	
New Brunswick	87	33	63.2	1.49	
Newton	83	29	59.8	2.22	
Oceanic	83	34	59.6	1.26	
Paterson	86	36	62.5	1.43	
Phillipsburg	88	34	62.6	0.95	
Plainfield	83	32	60.8	0.98	
Pleasantville	.....	.....	.....	3.10	
Rancocas	.....	.....	.....	1.51	
Rivervale	84	26	59.8	0.52	
Salem[b]	85	37	65.2	.....	
Sandyhook	82	41	59.3	1.28	
Somerville	86	29	61.6	0.42	
South Orange	82	32	60.0	1.21	
Sussex	85	29	60.8	1.36	
Toms River	88	28	60.6	0.68	
Trenton	84	40	63.8	1.72	
Tuckerton	82	28	60.0	2.45	
Vineland	87	32	62.6	2.92	
Woodbine	85	35	61.6	3.75	
Woodstown	.....	.....	.....	2.17	
New Mexico.					
Alamagordo	94	40	67.8	T.	
Albert	88	37	62.5	3.33	
Albuquerque[a]	88	33	62.1	.....	
Alma	90[d]	33[d]	60.5[d]	0.00	
Arbela	83	35	62.6	0.00	
Bellranch	94	39	66.5	1.60	
Bloomfield	85	27	56.7	0.24	T.
Brice	96	48	69.0	0.00	
Cambray	.....	.....	.....	0.00	
Carlsbad	98	43	72.0	0.56	
Chama	.....	.....	.....	1.35	6.0
Cimarron	83	31	56.0	0.83	
Cliff	90	30	60.7	0.10	
Cloudcroft	69	28	48.0	0.00	
Colmor	.....	.....	.....	0.25	T.
Deming	92	34	63.4	0.00	
Dorsey	83	31	55.8	1.00	
Eagle Rock Ranch	78	29	54.3	3.66	
Elizabethtown	73	23	46.6	0.70	.....
Elk	83	37	61.4	1.55	
Engle	87	35	63.1	0.00	
Espanola	82	32	58.3	0.12	
Estancia	89	34	59.4	0.01	
Fairview	.....	.....	.....	0.00	
Fort Bayard	87	34	60.0	0.07	
Fort Stanton	82	32	57.6	T.	
Fort Union	78	28	54.0	0.38	
Fort Wingate	82	25	55.0	0.50	.....
Gage	.....	.....	.....	0.06	
Gallinas Spring	85	40	61.4	0.00	
Laguna	88	31	59.9	0.60	
Lake Valley	.....	.....	.....	0.25	
Las Vegas	81	32	57.6	2.04	T.
Lordsburg	95	35	66.2	0.12	
Los Alamos	.....	.....	.....	1.33	
Los Lunas	93	38	64.8	0.10	
Luna	86	25	53.8	0.00	
Manuelito	.....	.....	.....	0.11	
Mesilla Park	94	38	65.6	0.06	
Mimbres	.....	.....	.....	T.	
Mineral Hill	.....	.....	.....	0.97	
Mountainair	84	26	58.1	0.32	
New Mexico—Cont'd.					
Palma	.....	.....	.....	0.08	
Portales	88	39	66.0	1.29	
Raton	81	30	56.0	1.62	
Redrock	.....	.....	.....	0.03	
Rincon	.....	.....	.....	T.	
Rosa	.....	.....	.....	0.59	
Rosedale	.....	.....	.....	0.20	
Salado	.....	.....	.....	0.00	
San Marcial	95	38	66.8	T.	
San Rafael	85	29	57.4	0.26	
Socorro	92	39	64.4	0.07	
Springer	84	31	58.8	2.01	
Strauss	.....	.....	.....	0.05	
Taos	84	28	55.0	0.47	T.
Trampas	.....	.....	.....	0.73	
Tres Piedras	78	22	49.1	0.68	0.5
Tucumcari	85	40	65.6	2.25	
Valley	.....	.....	.....	2.10	
Vermejo	76	25	50.6	0.73	T.
Weed	.....	.....	.....	1.00	
Whiteoaks	.....	.....	.....	0.01	
Winsors	72	24	46.3	0.64	.....
New York.					
Adams	82	34	56.7	2.77	1.0
Addison	85	26	58.4	1.78	
Akron	.....	.....	.....	3.77	
Ames	81	23	56.4	2.25	T.
Amsterdam	82	29	56.2	1.64	T.
Appleton	85	30	54.0	3.78	
Arcade	80	25	53.2	2.71	
Athens	86	33	60.8	0.41	T.
Atlanta	83	26	56.2	1.96	
Atwater	.....	.....	.....	2.05	
Auburn	82	30	56.6	3.00	
Avon	82	29	55.4	2.75	
Baldwinsville	82	30	56.6	2.00	
Ballston Lake	80	30	57.0	1.41	T.
Bedford	83	34	58.4	1.03	
Berlin	82	28	57.0	0.17	T.
Blue Mountain Lake	.....	.....	.....	3.96	T.
Bolivar	87	24	55.6	1.61	T.
Bouckville	79	18	52.0	2.35	T.
Brockport	84	31	56.6	2.80	
Cape Vincent	76	28	51.6	3.35	
Carmel	85	29	55.8	0.97	
Carvers Falls	79	28	55.6	1.83	
Chatham	83	29	59.0	0.94	
Chazy	75	31	54.8	2.89	T.
Coeymans	90	31	59.8	0.69	T.
Cold Spring Harbor	84	31	59.3	1.31	
Cooperstown	78	28	54.0	3.35	T.
Cortland	81	27	57.0	2.26	
Cutchogue	83	36	57.6	2.11	
Deansboro	.....	.....	.....	3.33	T.
Dekalb Junction	80	28	54.6	3.19	T.
De Ruyter	78	23	53.6	1.90	T.
Easton	.....	.....	.....	1.27	
Elba	80	30	55.0	3.35	
Elmira	86	28	59.8	1.75	
Faust	76	24	52.4	3.85	0.5
Fayetteville	83	28	57.4	2.54	
Fort Plain	83	30	59.3	2.34	T.
Franklinville	82	26	53.8	2.88	T.
Gabriels	79	18	49.7	1.65	
Gansevoort	.....	.....	.....	1.90	
Glens Falls	82	25	57.6	1.88	T.
Gloversville	79	28	55.6	2.40	T.
Greenfield	80	28	55.7	1.27	
Greenwich	80[d]	26[d]	57.0[d]	1.49	T.
Griffin Corners	79	21	53.5	1.28	T.
Harkness	79	32	54.6	2.07	T.
Haskinville	.....	.....	.....	1.26	
Hemlock	78	32	56.2	2.42	
Hunt	82	28	55.6	2.37	
Indian Lake	80	22	53.4	1.80	.....
Ithaca	82	29	55.8	1.92	T.
Jamestown	88	28	56.4	3.04	T.
Jeffersonville	84	23	58.1	1.46	T.
Lake George	77	27	55.6	1.58	T.
Le Roy	83	31	55.8	2.49	
Liberty	79	25	55.0	1.48	T.
Littlefalls, City Res.	77	29	56.0	2.43	T.
Lockport	81	32	55.2	3.22	
Lowville	79	30	53.0	3.07	
Lyndonville	.....	.....	.....	3.12	
Lyons	84	31	58.6	2.70	
Middletown	81	34	59.2	1.23	
Mohonk Lake	78	32	56.0	1.32	
Moira	80	30	54.4	2.74	T.
Mt. Hope	88	35	59.4	1.59	
Newark Valley	.....	.....	.....	1.80	
New Lisbon	79	20	52.6	2.73	
Number Four	75	25	49.2	4.40	0.8
Ogdensburg	.....	.....	.....	2.10	
Oneonta	83	27	58.0	2.25	T.
Oswegatchie	.....	.....	.....	4.59	0.5
Otto	85	30	56.8	2.75	
Oxford	79	26	56.6	3.11	
New York—Cont'd.					
Oyster Bay	84	37	61.2	1.14	
Palermo	.....	.....	.....	2.69	0.1
Perry City	84	26	55.6	2.03	T.
Plattsburg	89	32	58.0	2.16	T.
Port Jervis	85	28	60.1	2.04	
Potsdam	80	29	55.4	3.32	T.
Richland	.....	.....	.....	3.57	
Richmondville	81	28	56.0	2.40	T.
Ripley	84	31	56.8	4.70	
Romulus	82	29	56.6	1.28	
Salisbury Mills	.....	.....	.....	1.42	
Saranac	77	25	52.6	4.02	T.
Scarsdale	84	32	60.2	1.11	
Setauket	82	38	57.9	1.30	
Shortsville	80	28	55.8	2.15	
Skaneateles	.....	.....	.....	2.43	
Southampton	75	35	55.6	2.65	
South Canisteo	83	28	56.0	1.52	T.
South Kortright	81	21	55.2	1.56	T.
South Schroon	75	27	53.4	2.20	T.
Spier Falls	82	27	57.0	1.33	
Straits Corners	.....	.....	.....	1.75	
Ticonderoga	77	32	56.6	0.57	
Volusia	78	28	54.8	2.60	
Wappinger Falls	87	31	60.8	1.84	
Warwick	.....	.....	.....	1.51	
Watertown	80	29	55.2	3.64	
Waverly	88	23	59.0	1.61	
Wedgwood	80	28	54.9	2.06	T.
Wells	80	24	53.8	2.51	T.
West Berne	84	25	56.6	1.54	
Westfield	77	30	55.6	4.01	
Windham	81	26	56.2	1.33	T.
Youngstown	.....	.....	.....	3.04	
North Carolina.					
Battleboro	.....	.....	.....	3.17	
Brevard	90	40	67.1	10.19	
Brewers	89	33	66.2	5.23	
Bryson City	.....	.....	.....	5.13	
Buck Springs	80	39	59.0	.....	
Catawba	.....	.....	.....	4.66	
Chapelhill	90	47	70.0	7.85	
Currituck	.....	.....	.....	4.17	
Eagletown	88	46	69.0	2.48	
Edenton	92	46	71.3	3.05	
Fayetteville	92	50	72.0	6.06	
Goldsboro	93	50	72.3	5.64	
Graham	.....	.....	.....	7.60	
Greensboro	89	46	69.1	10.88	
Henderson	88	48	68.9	5.72	
Hendersonville	86	41	64.9	7.97	
Henrietta	94	46	70.4	4.89	
Horse Cove	84	48	64.6	11.04	
Hot Springs	85	50	69.0	.....	
Jefferson	83	42	62.9	9.27	
Kinston	92	49	73.0	5.57	
Lenoir	90	45	69.1	6.57	
Lexington	92	44	69.4	9.69	
Lincolnton	90	44	69.2	.....	
Linville	77	31	58.8	7.06	
Louisburg	89	47	70.3	5.36	
Lumberton	93	50	73.0	8.26	
Marion	93	45	69.0	7.31	
Marshall	87	39	65.0	6.15	
Moncure	93	46	71.0	5.27	
Monroe	92	45	69.2	6.68	
Morganton	92	42	68.2	6.25	
Mountairy	88	37	66.2	7.32	
Mount Holly	.....	.....	.....	6.87	
Murphy	.....	.....	.....	4.71	
Nashville	94	45	70.8	5.85	
Newbern	91	52	72.6	4.80	
Patterson*[1]	85	38	62.7	7.12	
Pinehurst	95	50	73.2	6.31	
Pink Beds	83	32	58.8	9.80	
Pittsboro	92	41	69.5	7.23	
Ramseur	93	43	70.6	8.12	
Randleman	.....	.....	.....	11.40	
Reidsville	89	45	68.8	8.20	
Salem	91	41	68.8	6.50	
Salisbury	90[d]	40[d]	68.3[d]	7.65	
Saxon	89	40	66.4	7.25	
Scotland Neck	92	48	71.2	4.64	
Selma	93	49	71.7	10.09	
Settle	89	42	68.4	9.65	
Sloan	93	48	71.6	8.75	
Snowhill	93	45	72.0	8.04	
Southern Pines	93	48	72.2	10.30	
Southport	88	58	73.6	3.97	
Statesville	90	41	69.0	6.78	
Tarboro	95	46	72.4	4.46	
Waynesville	86	39	63.9	5.66	
Weldon	93	45	71.2	3.66	
Whiteville	93	50	72.8	6.98	
North Dakota.					
Amenia	82	31	51.1	5.45	1.5
Ashley	81	20	48.0	4.71	14.0
Berlin	81	24	49.4	4.56	3.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bottineau	.....	.....	.....	6.00	
Buford	83	23	51.2	1.55	T.
Cando	83	25	48.3	1.75	8.0
Churchs Ferry	82	25	49.6	1.53	0.7
Coalharbor	84	18	49.5	1.83	7.0
Cooperstown	83	26	48.6	1.99	3.0
Dickinson	87	20	51.4	2.74	8.0
Donnybrook	85	16	48.8	1.88	3.0
Dunseith	83	21	49.2	1.45	5.0
Edgeley	80	26	51.4	4.33	5.0
Ellendale	86	25	50.5	3.80	
Elmore	88	25	52.3	1.17	4.0
Fargo	81	30	51.8	4.10	
Forman	82	30	51.8	5.10	6.0
Fort Berthold	80	20	51.4	1.18	
Fort Yates	84	24	52.0	2.91	2.0
Fullerton	81	24	50.2	6.02	2.4
Glenullin	86[c]	16[c]	49.0[c]	1.27	T.
Hamilton	84	27	50.0	4.09	9.0
Hannaford	80	27	50.4[a]	1.87	6.0
Jamestown	84	28	52.4	4.11	13.2
Kulm	81	28	50.3	5.51	9.5
LaFollette	81	11	47.2	2.16	T.
Lamoure	.....	.....	.....	4.15	T.
Langdon	.....	26	.....	3.63	T.
Larimore	85	26	48.8	2.38	4.0
Lisbon	82	28	50.6	5.75	3.0
McKinney	82	12	47.4	2.83	T.
Manfred	81	22	48.4	1.98	11.6
Mayville	83	27	50.7	3.66	
Medora	85	15	51.8	1.13	T.
Melville	82	26	51.4	1.95	2.5
Milton	80	26	50.1	.....	
Minnewaukon	86[d]	26[d]	49.4[d]	3.02	2.0
Minto	80	28	52.4	3.67	
Moyersville	80	20	48.0	1.78	11.2
Napoleon	83	19	48.2	2.69	14.0
New England	88	16	55.9	1.87	1.4
Oakdale	80	22	51.2	1.48	4.7
Oriska	82	34	57.0	4.56	4.5
Palermo	.....	.....	.....	1.34	1.0
Park River	85	28	50.8	3.04	T.
Pembina	85	28	50.3	4.09	T
Power	81	28	51.5	6.09	1.5
Rolla	79	25	48.8	5.34	8.3
Rugby	81	20	48.9	2.35	8.0
Sentinel Butte	.....	.....	.....	2.06	3.0
Steele	80	20	49.2	2.31	
University	83	30	51.6	3.89	
Wahpeton	83	32	53.6	5.29	
Walhalla	80	14	49.1	3.67	10.0
Washburn	86	20	51.0	1.12	7.5
Westhope	82	14	48.6	3.32	10.0
Willow City	82	10	47.3	2.59	0.3
Wishek	81	22	48.6	3.64	7.0
Ohio.					
Amesville	92	35	64.4	6.51	
Atwater	.....	.....	.....	4.55	
Bangorville	85	33	60.0	6.56	
Bellefontaine	84	31	59.0	5.27	
Benton Ridge	87	30	60.5	5.96	
Bladensburg	87	29	58.6	5.70	
Bowling Green	85	30	58.8	5.78	
Bucyrus	86	30	58.4	3.52	
Cadiz	86	34	61.9	3.50	
Cambridge	89	31	62.3	4.97	
Camp Dennison	89	40	64.8	9.50	
Canal Dover	87	30	60.2	5.80	
Canton	84	32	59.6	4.17	
Cardington	84	32	58.8	6.25	
Chillicothe	87	37	61.8	6.50	
Circleville	90	37	62.8	5.31	
Clarington	91	36	64.0	3.97	
Clarksville	86	38	63.4	7.88	
Cleveland *a*	80	34	58.1	5.12	
Coalton	89	36	63.6	6.95	
Colebrook	83	29	56.4	4.41	
Dayton	86	35	62.3	6.53	
Defiance	86	28	58.8	6.81	
Delaware	87	32	59.8	9.27	
Demos	89	33	61.8	4.17	
Findlay	89	31	60.5	5.90	
Frankfort	92	37	64.1	5.48	
Fremont	89	32	60.4	7.03	
Garrettsville	86	28	57.2	3.99	
Granville	88	33	61.0	4.32	
Gratiot	87	35	61.4	4.25	
Green	84	38	65.6	8.02	
Greenhill	86	26	57.8	3.03	
Greenville	86	34	59.5	6.46	
Hedges	86	29	59.4	4.39	
Hillhouse	85	28	56.0	5.74	
Hiram	84	33	59.0	5.18	T.
Hudson	91	31	58.7	5.04	
Ironton	93	42	67.6	8.91	
Jacksonburg	87	36	63.2	6.92	
Killbuck	87	31[f]	59.0[e]	6.91	
Lancaster	87	36	62.2	5.53	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
McConnelsville	88	36	61.8	6.23	
Manara	85	35	61.3	6.53	
Mansfield	.....	.....	.....	6.45	
Marietta	89	40	64.2	6.56	
Marion	88	29	60.9	5.09	
Medina	88	30	59.0	4.61	
Milfordton	87	29	59.2	7.23	
Milligan	88	33	61.4	5.05	
Millport	85	27	58.1	3.64	
Montpelier	86	35	59.4	6.90	
Napoleon	81	31	59.2	5.82	
Nellie	84	34	59.5	7.34	
New Alexandria	89	32	62.2	4.73	
New Berlin	86	30	58.9	4.52	
New Bremen	83	32	60.6	4.07	
New Richmond	86	39	65.3	6.84	
New Waterford	93	29	61.7	3.79	
North Lewisburg	87	33	60.7	5.95	
North Royalton	85	31	57.8	4.63	
Norwalk	89	32	59.8	6.03	
Oberlin	88	31	58.6	4.35	
Ohio State University	85	34	60.4	4.50	
Orangeville	83	26	58.0	3.52	
Ottawa	89	30	60.2	6.06	
Pataskala	87	33	61.2	5.66	
Philo	88	36	62.8	4.95	
Plattsburg	84	33	61.0	7.23	
Pomeroy	91	39	64.4	5.78	
Portsmouth	89	43	66.1	8.06	
Pulse	84	38	63.2	6.92	
Rittman	90	29	59.2	5.25	
Rockyridge	89	30	59.8	5.16	
Shenandoah	85	32	57.4	6.22	
Sidney	87	35	62.3	60.3	
Somerset	90	36	63.0	5.69	
South Lorain	90	30	58.8	4.16	
Springfield	.....	.....	.....	5.63	
Thurman	90	40	65.6	6.90	
Tiffin	85	33	60.0	5.75	
Upper Sandusky	86	31	59.9	5.51	
Urbana	86	32	60.7	6.86	
Vickery	88	32	58.2	6.06	
Warren	90	30	58.7	3.82	
Wauseon	88	26	58.2	5.02	
Waverly	92	39	65.2	7.60	
Waynesville	85	36	62.3	5.92	
Wellington	89	32	60.3	4.93	
Willoughby	.....	.....	.....	5.44	
Wilson	89	38	64.6	6.53	
Wooster	82	31	59.2	5.97	
Zanesville	.....	.....	.....	3.90	
Oklahoma.					
Alva	93	38	69.0	3.69	
Arapaho	89	44	68.2	3.44	
Binger	88	44	69.4	7.32	
Busch	87	47	66.8	4.20	
Chandler	91	44	71.1	5.70	
Cloud Chief	88	40	65.4	7.32	
Enid	88	43	66.8	4.00	
Erick	89	45	67.5	8.00	
Fort Reno	87	45	68.1	7.79	
Fort Sill	86	47	70.0	15.65	
Frederick	88	50	71.3	8.05	
Gage	90	40	65.6	4.67	
Grand	90	42	69.6	6.19	
Guthrie	88	49	69.2	6.63	
Harrington	88	43	66.2	3.78	
Hennessey	91	45	68.7	3.49	
Hobart	90	46	70.1	8.20	
Jefferson	90	42	66.8	3.33	
Jenkins	89	40	67.0	2.66	
Kenton	85	35	61.9	3.38	
Kingfisher	89	44	69.4	6.31	
Luther	89	42	69.3	10.07	
McComb	88	45	68.8	10.83	
Mangum	91	48	73.1	7.25	
Meeker	91	44	68.4	8.30	
Newkirk	89	46	68.0	3.92	
Norman	89	45	69.4	6.52	
Okeene	90	41	68.4	5.71	
Perry	89	45	68.4	4.27	
Shawnee	86	47	69.7	8.70	
Stillwater	89	48	68.1	4.86	
Taloga	.....	.....	.....	5.56	
Temple	89	45	72.2	4.85	
Watonga	88	44	67.6	4.53	
Waukomis	91	44	69.4	4.54	
Weatherford	87	46	66.8	3.76	
Whiteagle	90	45	67.8	3.83	
Woodward	.....	.....	.....	1.13	
Oregon.					
Alba	.....	.....	.....	1.82	
Albany	.....	.....	.....	2.07	
Alpha	86	32	54.4	2.13	
Arlington	87	31	59.6	1.11	
Ashland	85	31	53.4	2.74	
Astoria	69	39	53.4	6.37	
Aurora (near)	82	34	54.9	2.58	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bay City	71	32	51.0	7.20	
Bend	82	20	47.8	1.99	2.0
Beulah	79	20	46.7	2.10	
Blackbutte	75	30	50.0	3.30	
Blalock	92	23	63.2	1.16	
Bonita	84	33	52.0	5.95	
Bullrun	.....	.....	.....	7.87	
Burns	80	23	49.6	0.53	
Butter Creek	88	23	57.0	0.54	
Cascade Locks	87	35	56.5	4.75	
Condon	75	25	51.5	1.28	
Coquille	.....	.....	.....	1.87	
Corvallis	84	36	54.6	2.12	
Dale	.....	.....	.....	2.13	T.
Dayville	87	31	53.4	1.39	T.
Doraville	81	33	52.8	3.06	
Drain	85	31	54.6	2.23	
Ella	.....	.....	.....	0.79	
Eugene	78	36	54.1	2.99	
Fairview	80	31	52.9	3.50	
Falls City	81	33	52.8	1.84	
Forestgrove	85	33	54.6	1.54	
Gardiner	72	36	52.8	3.43	
Glendale	88	34	53.2	1.77	
Glenora	85	29	52.2	6.18	
Gold Beach	66	37	52.3	1.92	
Government Camp	70	24	41.2	7.68	41.0
Granite	.....	.....	.....	2.16	4.0
Grants Pass	92	30	54.8	1.89	
Grass Valley	78	20	49.0	1.70	
Heisler	77	29	53.4	.....	
Heppner	85	28	56.2	1.45	
Hood River	85	33	57.2	1.66	
Huntington	87	30	56.6	1.49	
Jacksonville	84	33	54.9	3.59	
John Day	92	30	53.5	1.51	T.
Joseph	79	25	46.1	2.91	12.5
Kerby	90	30	53.6	1.86	
Klamath Falls	74	25	47.2	1.56	T.
Lagrande	80	26	51.0	2.46	
Lakeview	88	20	48.0	1.41	
Lonerock	74	23	48.6	1.26	
McKenzie Bridge	89	28	52.8	5.65	
McMinnville	83	31	54.8	1.88	
Marshfield	75	35	54.0	2.86	
Mill City	81	27	51.5	3.64	
Monroe	80	35	54.2	1.80	
Mount Angel	84	37	55.5	2.79	
Nehalem	.....	.....	.....	8.59	
Newport	67	36	51.8	4.28	
Odell	.....	.....	.....	1.65	T.
Ontario	.....	.....	.....	1.82	
Paisley	81	27	49.7	.....	.....
Pendleton	83	24	55.6	1.13	
Port Oxford	62	40	50.6	2.50	
Prineville	84	25	49.4	0.98	T.
Riverside	90	19	51.2	2.16	T.
Salem	82	38	55.6	1.57	
Silverlake	81	18	45.0	1.48	
Sparta	80	26	51.5	0.76	T.
Stafford	83	34	54.4	3.06	
The Dalles	86	32	59.6	0.66	
Tipton	.....	.....	.....	1.10	
Toledo	80	33	52.0	4.13	
Umatilla	88	34	60.9	1.06	
Vale	87	25	54.4	0.84	
Van	.....	.....	.....	0.54	T.
Wallowa	86	24	50.2	1.37	
Wamic	77	25	49.9	1.05	
Warm Spring	81	28	53.8	1.27	
Weston	78	23	50.0	4.20	
Williams	89	29	53.9	1.70	
Pennsylvania.					
Aleppo	88	29	61.4	3.40	
Altoona	87	31	59.2	4.69	
Beaver Dam	.....	.....	.....	5.01	
Bellefonte	88	33	62.4	2.88	
Brookville	.....	.....	.....	2.52	
Browers	.....	.....	.....	1.24	
California	90	34	64.0	2.68	
Cassandra	84[d]	28	57.8[b]	2.80	
Centerhall	88	32	61.4	2.87	
Clarion	.....	.....	.....	2.96	
Claysville	92	29	62.6	3.43	
Clearfield	.....	.....	.....	3.20	
Coatsville	87	34	62.8	1.19	
Confluence	.....	.....	.....	3.80	
Coudersport	86	25	56.2	2.14	
Davis Island Dam	.....	.....	.....	3.25	
Derry	88	30	62.2	4.56	
Doylestown	.....	.....	.....	1.10	
Dushore	82	24	57.8	1.88	
East Mauch Chunk	90	31	62.2	1.30	
Easton	85	34	62.6	1.05	
Ellwood Junction	.....	.....	.....	3.54	
Emporium	88	32	59.4	1.75	
Ephrata	86	35	62.2	1.60	
Everett	87	32	60.9	4.10	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Pennsylvania—Cont'd.	°	°	°	Ins.	Ins.
Forks of Neshaminy	...	...	...	2.15	
Franklin	88	29	58.8	3.11	
Freeport	90	31	62.2	2.92	
Gettysburg	91	35	64.4	1.88	
Girardville	...	...	...	2.50	
Gordon	89	26	60.4	1.56	
Grampian	85	27	56.4	2.26	
Greensboro	...	...	...	2.54	
Greenville	87	29	58.6	4.06	
Hamburg	87	31	63.2	1.28	
Hanover	91	36	64.4	2.65	
Herrs Island Dam	...	...	...	3.08	
Huntingdon	90	30	61.6	4.26	
Indiana	85	31	59.8	4.60	
Irwin	90	29	62.9	3.58	
Johnstown	89	33	63.2	4.08	
Kennett Square	84	37	61.8	3.51	
Lansdale	...	...	...	0.96	
Lawrenceville[b]	86	25	57.8	...	
Lebanon	88	34	62.8	2.67	
Leroy	81	31	57.5	1.89	T.
Lewisburg	93	32	61.3	2.11	
Lockhaven	93	34	63.0	3.01	
Lock No. 4	...	...	...	2.46	
Lycippus	84	36	62.1	5.17	
Marion	86	34	63.0	2.21	
Mifflintown	89	31	62.0	2.91	
Milford	86	25	59.5	1.49	
Montrose	82	25	55.6	2.23	
New Germantown	87	33	61.4	4.08	
Ottsville	...	...	...	0.91	
Parker	...	...	...	3.80	
Philadelphia	85	43	64.2	2.11	
Pocono Lake	84	22	56.8	1.87	
Point Pleasant	...	...	...	0.56	
Pottsville	...	...	...	1.50	
Reading	86	33	63.4	1.96	
Saegerstown	86	28	56.7	4.01	
St. Marys	86	30	56.4	2.48	
Saltsburg	...	...	...	3.21	
Seisholtzville	...	...	...	0.67	
Selinsgrove	89	33	62.0	2.62	
Shawmont	...	...	...	2.18	
Skidmore	86	28	59.3	4.12	
Smiths Corners	...	...	...	0.77	
Somerset	87	28	56.6	4.84	
South Eaton	86	27	60.0	1.59	
Springdale	...	...	...	3.72	
Springmount	...	...	...	1.01	
State College	85	34	58.6	3.74	
Swarthmore	83	37	62.6	1.67	
Towanda	83	25	58.4	1.48	T.
Uniontown	88	37	63.5	3.18	
Warren	91	28	58.6	3.47	
Wellsboro	84	29	56.6	...	T.
Westchester	84	39	62.8	3.35	
West Newton	...	...	...	2.94	
Wilkesbarre	87	32	61.2	1.39	
Williamsport	86	35	62.4	2.09	
Rhode Island.					
Bristol	73	38	55.3	1.45	
Kingston	80	30	55.0	1.69	
Narragansett	73	33	53.6	2.11	
Pawtucket	88	39	61.6	1.77	
Providence *a*	89	38	60.8	1.53	T.
South Carolina.					
Aiken	98	51	74.6	4.35	
Anderson	94	51	72.3	7.76	
Barksdale	91	52	71.9	3.68	
Beaufort	91	63	76.1	4.21	
Bowman	97	52	74.9	6.21	
Calhoun Falls	...	...	...	8.12	
Camden	...	...	...	5.40	
Cheraw	91	52	72.2	6.97	
Clarks Hill	95	54	73.7	3.73	
Clemson College	89	49	72.2	8.65	
Conway	96	53	74.2	4.95	
Darlington	91	50	71.8	7.61	
Dillon	95	54	74.6	5.42	
Due West	92	54	72.0	7.00	
Edisto	...	...	...	3.40	
Effingham	...	...	...	8.98	
Enoree	...	...	...	6.15	
Florence	95	53	73.4	4.94	
Gaffney	96	50	72.2	6.77	
Georgetown	90	60	74.2	4.39	
Heath Springs	95	54	73.1	4.53	
Kingstree	95	57	75.8	3.77	
Liberty	94	42	71.0	6.72	
Little Mountain	96	55	73.1	5.18	
Newberry	97	52	73.4	3.99	
Pelzer	...	...	...	6.17	
Pinopolis *1	90	58	71.5	3.97	
St. George	95	56	75.0	5.84	
St. Matthews	91	53	72.6	8.82	
St. Stephens	...	...	...	7.02	
Saluda	95	51	73.4	3.52	
Santuck	95	49	71.4	7.21	
South Carolina—Cont'd.	°	°	°	Ins.	Ins.
Selvern	99	47	72.8	3.79	
Smiths Mills	...	...	...	9.50	
Society Hill	91	54	73.2	5.86	
Statesburg	95	56	73.6	6.95	
Summerville	93	55	73.8	4.05	
Trenton	95	56	74.3	4.10	
Trial	96	52	74.0	5.70	
Walhalla	98	46	70.0	8.70	
Walterboro	98	56	75.8	6.41	
Winnsboro	94	53	73.2	3.60	
Winthrop College	93	52	71.6	7.43	
Yemassee	96	57	75.0	6.70	
Yorkville	93	54	72.8	7.90	
South Dakota.					
Aberdeen	84	28	53.1	8.00	...
Academy	85	29	54.0	5.24	0.5
Alexandria	82	28	54.4	6.45	T.
Armour	84	29	55.8	6.04	
Ashcroft	85	23	50.4	1.36	T.
Bowdle	82	25	51.1	5.68	11.0
Brookings	77	30	51.2	6.14	T.
Canton	81	31	54.4	4.65	T.
Centerville	80	31	55.3	5.16	
Chamberlain	85	30	55.1	3.96	...
Cheyenne	85	22	53.2	4.05	T.
Clark	78	27	51.8	7.06	3.0
Clear Lake	76	30	50.5	8.62	T.
Doland	81	26	52.4	8.61	4.0
Elkpoint	86	31	57.4	7.47	
Fairfax	88	28	55.3	4.10	T.
Farmingdale	...	...	...	6.48	7.0
Faulkton	82	25	51.3	5.42	4.0
Flandreau	81	30	53.2	7.49	T.
Forestburg	86	24	54.6	5.32	T.
Fort Meade	79	24	50.2	5.94	...
Gannvalley	83	28	53.7	7.36	0.5
Grand River School	86	24	52.6	4.27	5.0
Greenwood	80	33	56.4	6.20	
Highmore	79	26	51.4	5.23	2.0
Hitchcock	...	...	...	6.78	...
Hotch City	83	27	52.8	4.37	3.5
Howard	77	27	53.4	4.56	...
Howell	83	26	52.4	6.36	0.9
Ipswich	83	23	50.8	6.00	3.5
Kidder	81	25	50.4	8.92	6.0
Kimball	80	29	54.0	6.41	
Leola	86	26	51.5	5.45	1.0
Leslie	85	29	53.1	3.63	
Marion	79[d]	28[f]	55.2[e]	5.88	
Mellette	83	25	52.8	5.82	
Menno	81	32	55.2	5.37	...
Mil'bank	80	30	52.4	7.35	...
Mitchell	82	29	54.3	5.01	2.5
Oelrichs	91	30	50.6	4.09	
On-the-Trees Camp	83	24	51.7	3.37	2.0
Pine Ridge	83	23	51.6	4.33	4.0
Plankinton	82	27	53.8	4.20	T.
Ramsey	...	24	...	5.86	T.
Redfield	81	25	51.3	6.26	2.0
Rousseau	...	...	...	3.12	...
Sioux Falls	82	31	55.4	6.41	
Sisseton Agency	79	30	51.4	7.65	0.8
Spearfish	78	25	49.6	6.95	24.0
Stephan	83	26	52.4	4.14	T.
Vermillion	85	33	57.0	9.51	
Watertown	78	25	50.8	...	
Wentworth	81	30	53.5	5.90	
Wolsey	...	...	...	7.55	...
Tennessee.					
Andersonville	89	40	68.1	7.10	
Arlington	93	45	71.2	6.39	
Ashwood	90	48	70.1	6.45	
Benton	91	43	71.2	4.93	
Bluff City	...	...	...	3.53	
Bolivar	90	44	70.8	5.65	
Bristol	88	41	67.5	2.20	
Brownsville	88	50	70.6	6.84	
Byrdstown	89	42	69.5	5.18	
Catlettsburg	...	...	...	4.04	
Cedar Hill	89	47	70.6	5.40	
Celina	...	...	...	4.38	
Charleston	...	...	...	3.81	
Clarksville	89	46	70.1	6.25	
Clinton	...	...	...	5.85	
Covington	88	55	71.6	6.23	
Dandridge	...	...	...	5.24	
Decatur	90	45	70.2	5.88	
Dickson	90	40	69.3	7.07	
Dover	92	41	70.8	10.47	
Dyersburg	90	49	70.9	9.84	
Elizabethton	89	41	67.0	4.27	
Erasmus	88	35	65.4	6.39	
Florence	89	45	70.4	4.29	
Franklin	89	45	70.0	4.18	
Greeneville	87	42	67.2	5.05	
Halls Hill	...	...	...	6.03	
Harriman	87	45	68.5	5.42	
Hohenwald	89	40	67.4	5.94	
Tennessee—Cont'd.	°	°	°	Ins.	Ins.
Iron City	90	43	70.2	6.88	
Isabella	91[e]	47[e]	72.0[e]	6.30	
Jackson	91	44	72.4	5.65	
Johnsonville	91	42	70.8	6.88	
Jonesboro	88	...	67.2[d]	...	
Kenton	87	46	70.0	4.34	
Kingston	...	...	...	4.42	
Lafayette	91	40	69.8	4.38	
Leadvale	...	...	...	4.00	
Lewisburg	92	42	71.8	7.69	
Loudon	...	...	...	4.90	
Lynnville	89	45	71.2	7.41	
McGee	...	...	...	3.50	
McMinnville	90	44	70.0	5.90	
Maryville	91	44	70.3	6.02	
Milan	90	47	71.3	7.24	
Newport	89	44	70.1	9.12	
Palmetto	90	44	71.0	9.43	
Pope	92	39	70.4	7.25	
Rogersville	88	39	67.8	3.54	
Rotherwood	...	...	...	3.33	
Rugby	90	34	66.1	4.71	
Savannah	91	50	71.4	4.99	
Sewanee	86	48	68.0	5.21	
Silver Lake	82	38	62.7	7.19	
Springdale	89	37	68.8	6.49	
Springville	89	43	70.3	9.80	
Tazewell	...	...	...	5.59	
Tellico Plains	90	43	70.4	3.27	
Tracy City	85	40	67.2	5.96	
Trenton	90	47	73.0	5.23	
Tullahoma	90	43	70.6	6.62	
Union City	93	45	70.6	7.76	
Walling	...	...	...	4.53	
Waynesboro	91	40	69.9	4.26	
Wildersville	86	45	70.2	7.21	
Yukon	92	50	71.6	4.15	
Texas.					
Albany	92	46	72.6	5.55	
Alvin	...	...	...	3.34	
Anson	...	...	...	5.04	
Arthur	...	...	...	8.44	
Athens	94	53	76.4	11.25	
Austin	95	58	77.2	1.87	
Ballinger	93	43	73.6	2.29	
Beaumont	101	57	80.2	3.52	
Beeville	92	59	78.6	4.98	
Bigspring	97[e]	47[e]	73.3[e]	5.71	
Blanco	91	50	74.0	1.37	
Boerne	90	56	75.0	0.17	
Bonham	87	49	72.6	8.61	
Booth	...	...	...	2.74	
Bowie	89	49	72.8	4.58	
Brazoria	94	61	78.1	1.59	
Brenham	90	60	77.1	5.74	
Brighton	87[e]	59[e]	78.2[e]	2.64	
Brownwood	89	50	73.7	5.81	
Channing	86	36	64.0	2.27	
Childress	91	46	70.4	2.87	
Clarendon	85	47	68.0	3.53	
Clarksville	92	53	73.8	10.14	
Claude	87	41	65.6	4.14	
Claytonville	95	46	72.8	2.54	
Coleman	86	48	72.2	5.67	
College Station	95	57	78.4	3.10	
Colorado	95	42	74.4	2.73	
Columbia	90	62	78.2	0.52	
Columbus	...	...	...	5.91	
Comanche	98[f]	54[f]	75.0[f]	4.28	
Comstock	94	55	74.5	3.49	
Corsicana	94	55	77.2	5.32	
Cotulla	95	63	79.4	6.10	
Crockett	87	55	74.8	11.41	
Cuero	96	58	78.4	4.13	
Dallas	90	51	73.4	7.65	
Danevang	97	60	79.6	1.45	
Decatur	88	55	72.0	4.34	
Dialville	90	52	74.8	5.58	
Dublin	96	50[f]	72.1[e]	7.25	
Duval	89	58	75.8	1.14	
Eagle Pass	95	56	78.6	5.88	
Fort Brown	92	63	81.2	0.98	
Fort Clark	92	55	77.3	2.40	
Fort Davis	92	41	68.4	0.22	
Fort McIntosh	102	59	82.0	2.58	
Fort Stockton	97	48	72.8	1.84	
Fredericksburg	88[e]	50[e]	74.4[e]	2.56	
Gainesville	87	46	71.6	8.10	
Gatesville	91	54	75.7	6.80	
Georgetown	92	53	76.0	1.83	
Gonzales	...	...		2.27	
Graham	92	46	73.6	2.83	
Grapevine	90	49	73.8	6.55	
Greenville	95	50	73.8	12.01	
Hale Center	87	45	73.2	3.53	
Hallettsville	93	60	79.7	4.40	
Haskell	95	47	72.4	3.36	
Hearne	93	56	75.6	4.16	

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TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Texas—Cont'd.					
Hempstead	.....	.....	.....	7.15	
Henrietta	88	48	71.9	6.38	
Hereford	90	34	66.4	2.07	
Hewitt	.....	.....	.....	6.72	
Hillsboro	92	52	74.8	7.50	
Hondo	92	56	77.1	1.98	
Houston	93	59	79.0	1.46	
Huntsville	93	56	78.0	3.29	
Jefferson	88	52	75.0	12.38	
Jewett	90	54	75.0	6.39	
Kaufman	91	53	75.3	8.65	
Kent	96	46	72.0	1.20	
Kerrville	89	49	74.6	1.87	
Knickerbocker	93	47	74.0	6.14	
Kopperl	.....	.....	.....	7.90	
Lampasas	92	52	74.8	3.80	
Lapara	.....	.....	.....	0.66	
Laureles Ranch	.....	.....	.....	1.06	
Liberty	94	53	73.4	4.65	
Lone Star Ranch	95	41	68.3	1.68	
Longlake	.....	.....	.....	7.58	
Longview	93	54	76.0	7.59	
Luling	93	60	78.4	2.13	
McKinney	90	48	73.1	14.93	
Marlin	92	54	76.4	8.21	
Menardville	91	41	73.0	1.84	
Mexia	90	53	75.0	5.01	
Mobeetie	90	45	66.6	4.22	
Mount Blanco	90	47	73.3	3.09	
Mount Pleasant	91	51	74.0	12.05	
Nacogdoches	89	56	75.2	8.99	
Orange	.....	.....	.....	6.30	
Panter	.....	.....	.....	8.46	
Paris	90	53	74.4	5.69	
Pearsall	96	45	79.2	3.88	
Pierce	94	62	78.7	0.75	
Port Lavaca	90	60	78.2	1.27	
Quanah	90	49	71.8	2.40	
Rhineland	93	40	71.2	3.50	
Riverside	.....	.....	.....	4.39	
Rockisland	91	58	77.4	4.71	
Rockland	.....	.....	.....	7.02	
Rockport	88	62	74.4	4.80	
Runge	.....	.....	.....	3.42	
Sabinal	95	55[c]	76.7[c]	2.81	
San Marcos	91	56	77.1	2.12	
San Saba	91	48	74.8	3.29	
Santa Gertrude	.....	.....	.....	0.82	
Sherman	82	52	73.2	12.46	
Sonora	92	47	73.3	3.84	
Sugarland	93	64	80.1	2.16	
Sulphur Springs	88	52	73.4	16.00	
Temple	91	55	76.0	5.78	
Tilden	97	57	80.3	4.00	
Trinity	92	56	77.2	4.87	
Tulia	90	40	64.7	2.48	
Tyler	93	53	75.8	8.88	
Valley Junction	.....	.....	.....	3.70	
Victoria	92	60	78.4	2.45	
Waco	98	56	78.3	8.39	
Waxahachie	92	52	74.6	5.36	
Weatherford	89	49	73.8	4.03	
Wharton	98	50	72.5	4.20	
Wichita Falls	.....	.....	.....	9.90	
Willspoint	90	51	73.7	9.56	
Utah.					
Alpine	.....	.....	.....	1.75	
Alta	.....	.....	.....	4.04	44.0
Aneth	90	31	59.2	0.39	
Beaver[1]	78	24	48.6	.....	
Blackrock	86	30	53.2	1.52	3.0
Blacksmith Forks	.....	.....	.....	2.33	0.8
Castledale	81	19	48.8	0.40	4.0
Castle Rock	.....	.....	.....	0.51	
Cisco	83	35	59.6	1.60	
Corinne	88	33	54.6	2.85	
Coyoto	78	18	44.4	1.82	.....
Deseret	86	27	53.6	1.35	
Emery	67	22	45.3	0.70	7.0
Escalante	81	27	52.8	0.87	
Experiment Farm	94	37	62.6	.....	
Farmington	86	33	53.8	2.80	
Fillmore	91	28	55.3	2.45	
Fort Duchesne	86	28	53.2	0.89	2.8
Frisco	85	22	52.6	1.44	6.0
Garrison	86	26	52.4	1.83	T.
Giles	88	30	57.6	1.30	
Government Creek	81	26	50.0	2.17	4.0
Grayson	83	18	53.0	1.40	3.0
Green River	.....	32	.....	1.65	2.0
Heber	82	29	50.5	1.27	.....
Henefer	81	25	49.4	1.14	.....
Hite	93	35	64.0	1.58	
Huntsville	.....	.....	.....	2.80	1.0
Ibapah	82	22	47.8	2.20	4.0
Indianola	.....	.....	.....	1.11	
Kelton[a1]	85	30	51.6	2.25	
La Sal	76	23	49.2	2.17	8.0
Utah—Cont'd.					
Levan	80	27	50.5	2.60	1.5
Loa	80	20	47.8	0.10	1.0
Logan	90	30	54.4	2.13	
Lucin	80	28	51.4	3.05	
Manti	78	29	49.9	2.25	.....
Marion	.....	.....	.....	1.15	2.0
Marysvale	83	22	49.0	1.85	9.4
Meadowville	75	23	46.3	4.15	T.
Millville	.....	.....	.....	2.11	
Minersville	86	34	58.2	1.47	2.0
Moab	93	34	60.0	2.28	T.
Morgan	80	27	49.4	1.69	.....
Mount Nebo	87	32	53.9	1.18	.....
Mount Pleasant[d]	80	27	44.7	1.25	
Nephi	.....	.....	.....	1.71	
Oak City	85	28	55.2	1.91	1.0
Ogden	85	33	55.4	4.25	
Parowan	83	24	50.8	1.99	15.4
Payson	.....	.....	.....	1.98	
Pinto	79	24	46.8	2.09	
Plateau	82	23	45.8	1.42	12.1
Provo	89	32	54.4	1.85	
Ranch	76	21	45.8	1.88	
Randolph	.....	.....	.....	1.07	
Rockville	96	35	64.2	1.65	
St. George	94	37	63.2	1.11	
Salt Air	82	34	55.8	2.29	T.
Scipio	86	25	51.9	3.08	4.0
Snowville	81	25	48.6	2.30	.....
Soldier Summit	78	21	44.4	0.49	
Sunnyside	.....	.....	.....	2.83	9.5
Thistle	88	30	51.8	0.70	T.
Tooele	83	30	52.9	1.42	
Torrey	80	25	49.2	0.54	0.4
Tropic	78	26	49.4	1.11	1.0
Trout Creek	80	21	51.4	0.60	
Utah Lake	96	30	58.6	0.85	
Vernal	80	31	52.9	1.38	3.5
Woodruff	79	22	46.8	2.35	
Vermont.					
Burlington	74	36	56.6	2.58	T.
Cavendish	81	26	53.8	1.92	
Chelsea	76	28	51.4	1.33	2.0
Chittenden	.....	.....	.....	2.89	
Cornwall	78	31	56.6	1.88	T.
Derby	69	30	48.0	2.21	
Enosburg Falls	77	27	53.4	3.11	1.4
Jacksonville	80	28	54.8	1.32	T.
Manchester	76	29	54.4	2.27	T.
Norwich	79	25	53.0	1.96	T.
St. Johnsbury	80	27	54.6	2.68	T.
Wells	76	26	54.2	2.29	
Westfield	.....	.....	.....	3.88	.....
Woodstock	79	24	52.4	1.60	T.
Virginia.					
Arvonia	91	36	68.4	6.10	
Ashland	90	40	67.6	3.28	
Barboursville	87	40	67.2	4.55	
Bigstone Gap	87	39	66.4	3.32	
Blacksburg	86	37	63.0	7.45	
Buchanan	.....	.....	.....	8.49	
Buckingham	.....	.....	.....	5.50	
Burkes Garden	83	33	59.2	6.30	
Callaville	92	42	70.0	4.17	
Cape Henry	91	53	68.4	2.84	
Charlottesville	90	45	67.6	4.06	
Clarksville	.....	.....	.....	5.41	
Columbia	89	39	67.3	9.58	
Dale Enterprise	90	33	64.3	2.77	
Danville	.....	.....	.....	8.36	
Dinwiddie	92	37	67.6	4.54	
Elk Knob	84	46	66.2	4.52	
Farmville	89	39	67.6	3.61	
Fredericksburg	88	36	66.6	4.28	
Grahams Forge	85	35	64.7	8.12	
Greenwich	89	40	65.6	3.68	
Hampton	91	52	68.2	3.24	
Hot Springs	84	34	61.9	5.51	
Ivanhoe	.....	.....	.....	7.88	
Lexington	91	35	66.3	6.23	
Lincoln	92	35	64.0	2.70	
Marion	86	37	64.0	5.29	
Mendota	.....	.....	.....	2.62	
Newport News	88	51	70.2	3.08	
Petersburg	.....	45	.....	4.18	
Quantico	89	31	66.8	.....	
Radford	.....	.....	.....	5.48	
Randolph	.....	.....	.....	4.66	
Riverton	.....	.....	.....	2.36	
Roanoke	91	41	69.0	7.15	
Rockymount	89	40	67.0	5.47	
Saxe	90	40	68.2	5.13	
Shenandoah	.....	.....	.....	3.55	
Speers Ferry	.....	.....	.....	3.48	
Spottsville	92	40	68.8	4.07	
Stanardsville	88	35	65.6	3.42	
Staunton	88	38	66.0	4.03	
Stephens City	91	35	65.2	3.35	
Virginia—Cont'd.					
Warsaw	91	37	68.4	4.94	
Williamsburg	83	40	65.9	3.09	
Woodstock	92	36	65.5	3.65	
Washington.					
Aberdeen	78	31	52.7	4.52	
Anacortes	74[d]	35[d]	52.4[d]	2.81	
Ashford	.....	.....	.....	8.56	
Bellingham	78	34	53.4	2.80	
Blaine	75	33	52.9	2.76	
Bremerton	81	37	51.2	2.72	
Brinnon	76	34	53.5	3.56	
Cedonia	77	26	51.6	2.44	1.0
Centralia	84	29	55.1	3.72	
Cheney	84	26	55.4	1.77	
Clearbrook	83	29	53.0	4.24	
Clearwater	81	30	52.4	6.51	
Cle Elum	80	24	50.4	1.53	
Colfax	84	28	53.1	2.02	
Colville	86	26	52.8	2.73	
Conconully	81	25	52.8	1.04	
Coupeville	75	38	53.9	3.68	
Crescent	82	24	52.2	1.37	
Cusick	86	22	52.0	2.13	
Danville	83	25	52.8	1.78	
Dayton	82	30	53.9	3.76	
East Sound	78	30	52.1	3.01	
Ellensburg	84	25	54.0	0.54	
Ephrata	85	34	57.9	0.20	
Grandmound	.....	.....	.....	3.47	
Granite Falls	.....	.....	.....	6.48	
Hannas Ranch	85	42	60.4	.....	
Hatton	100	21	61.1	1.25	
Horse Heaven	.....	.....	.....	0.99	
Ilwaco	70	37	52.6	5.03	
Kennewick	86	26	59.8	0.88	
Kiona	86	27	59.6	0.67	
Lacenter	84	32	53.7	4.38	
Lakeside	82	37	57.7	0.69	
Lester	81	30	50.4	5.27	
Lind	84	30[h]	56.8[d]	2.12	
Loomis	85	36	57.6	1.40	
Mottinger Ranch	90	35	63.2	0.86	
Mount Pleasant	81	34	54.2	5.76	
Moxee	86	27	56.4	0.71	
Northport	84	22	51.4	2.58	
Odessa	87	23	56.0	0.72	
Olga	72	40	53.1	3.01	
Olympia	86	30	54.2	2.85	
Pinehill	85	29	56.1	1.00	
Pomeroy	87	27	54.3	2.23	
Port Townsend	73	36	52.4	3.39	
Pullman	84[e]	31[d]	52.4[d]	1.62	T.
Republic	81	21	50.1	1.63	
Ritzville	.....	.....	.....	1.14	
Rosalia	82	27	52.2	1.54	
Sedro	78	34	53.6	3.81	
Silvana	78	30	52.2	4.57	
Snohomish	77	33	53.9	5.63	
Snoqualmie	84	31	54.5	6.75	
Southbend	85	34	53.8	5.24	
South Ellensburg	84	26	54.2	0.07	
Sprague	.....	.....	.....	2.30	
Sunnyside	82	32	57.8	0.75	
Touchet	8-	24	59.2	0.78	
Twisp	88	30	55.1	0.62	
Union	82	30	53.9	3.22	
Vancouver	86	35	56.4	3.36	
Vashon	74	38	53.6	3.83	
Wahluke	88	31	60.1	0.14	
Waterville	82	27	51.6	0.82	
Wenatchee (near)	83	29	55.2	0.71	
Wilbur	85	23	52.0	1.14	
Zindel	90[h]	35[h]	57.8[h]		
West Virginia.					
Bancroft	90	40	66.5	4.94	
Bayard	87	26	59.5	4.09	
Bens Run	94	39	65.0	6.81	
Berkley Springs	90	34	64.5	1.78	
Bluefield	87	41	65.4	7.67	
Buckhannon	83	34	62.3	5.09	
Burlington	89	31	63.0	4.54	
Central	92	33	62.9	4.27	
Chapel	85	34	66.2	5.12	
Charleston	89	44	68.4	5.69	
Creston	90	36	63.5	4.91	
Cuba	86	39	64.3	5.19	
Elkhorn	87	38	65.6	7.10	
Fairmont	92	33	63.5	4.44	
Glenville	93	36	65.2	6.15	
Grafton	90	33	63.7	4.81	
Green Sulphur Springs	87	33	63.0	5.28	
Harpers Ferry	.....	.....	.....	1.86	
Hinton	.....	.....	.....	5.13	
Huntington	90	41	67.2	6.34	
Leonard	79	39	63.8	5.65	
Lewisburg	86	35	64.4	5.76	
Logan	91	40	67.7	5.66	
Lost Creek	88	31	62.4	7.70	

TABLE II.—*Climatological record of cooperative observers. Late reports for April*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Madison	90	38	64.5	4.03	
Mannington	87	34	62.8	3.97	
Marlinton	85	30	60.5	3.91	
Martinsburg	92	39	64.7	1.90	
Moorefield	93	32	66.2	2.81	
Morgantown	87	30	62.5	3.63	
Moundsville	90	34	63.8	3.02	
New Cumberland	86	33	61.2	6.30	
New Martinsville	94	37	65.6	4.47	
Nuttallburg	90	36	65.2	5.70	
Parsons	89	28	60.6	4.70	
Philippi	90	32	64.0	6.31	
Pickens	95	33	61.0	6.24	
Point Pleasant	93	42	67.8	7.96	
Romney	89	34	64.6	3.66	
Rowlesburg	.....	.....	.....	4.67	
Ryan	90	32	64.4	4.17	
Smithfield	90	32	65.4	3.91	
Southside	90	40	65.4	5.43	
Sutton	96	38	68.4	3.77	
Terra Alta	86	32	59.6	7.57	
Uppertract	91	32	64.0	4.45	
Valley Fork	91	33	65.0	4.97	
Webster Springs	95	35	66.1	5.20	
Wellsburg	85	35	60.9	2.89	
Weston	96	31	65.0	5.68	
Wheeling	91	39	70.2	4.38	
Williamson	92	40	67.4	3.59	
Wisconsin.					
Amherst	80	26	52.8	5.05	
Antigo	78	29	54.2	.....	
Appleton	83	23	53.3	4.35	
Appleton Marsh	83	23	52.8	6.65	
Ashland	.....	.....	.....	3.13	
Barron	80	26	51.6	4.50	
Beloit	82	35	57.2	4.21	
Berlin	78	29	54.5	4.86	
Black River Falls	.....	.....	.....	6.10	
Burnett	83	28	54.3	6.61	
Butternut	76	25	50.2	4.47	
Chilton	83	28	53.3	6.09	
Chippewa Falls	.....	.....	.....	4.65	
Citypoint	83	.....	.....	5.42	
Darlington	85	30	57.4	6.47	
Downing	78	20	52.7	5.90	
Eau Claire	81	32	56.4	6.61	
Florence	77	19	48.4	3.29	
Fond du Lac	85	25	55.4	6.79	
Grand Rapids	84	27	53.8	4.24	
Grand River Locks	.....	.....	.....	7.23	
Grantsburg	81	23	51.8	3.19	
Hancock	80	30	53.9	6.64	
Harvey	83	30	56.0	6.98	
Hayward	79	23	49.4	2.68	
Hillsboro	81	26	53.4	7.09	
Koepenick	85	18	51.1	4.00	
Ladysmith	80	22	51.9	4.56	T.
Lancaster	81	36	56.6	7.17	
Manitowoc	71	29	50.1	5.08	
Mauston	83	30	55.2	7.07	
Meadow Valley	81	26	52.9	5.96	
Medford	80	27	52.2	5.35	
Menasha	.....	.....	.....	4.17	
Minocqua	75	27	52.4	2.95	T.
Mount Horeb	82	31	56.2	6.68	
Neillsville	84	28	53.4	5.23	
New London	82	27	53.5	5.58	
New Richmond	79	29	54.2	3.98	
Oconto	80	26	51.6	4.34	
Osceola	79	27	51.9	2.77	T.
Oshkosh	83	30	54.0	5.47	
Pine River	82	28	53.5	5.95	
Portage	83	32	56.6	7.64	
Port Washington	80	29	49.6	7.42	
Prairie du Chien	92	36	59.3	7.00	
Prentice	81	21	52.8	4.17	
Racine	78	34	53.4	4.49	
Sheboygan	75	30	51.2	6.41	
Spooner	84	23	51.2	2.66	
Stanley	80	27	52.8	5.85	
Stevens Point	81[j]	30[k]	52.8[k]	4.58	
Sturgeon Bay Canal	69	23	48.2	5.79	
Tomahawk	.....	.....	.....	4.55	
Valley Junction	81	23	54.2	7.20	
Viroqua	83	32	55.2	7.47	
Watertown	83	29	55.8	5.82	
Waukesha	85	30	54.4	6.71	
Waupaca	81	24	53.4	4.93	
Wausau	78	30	53.0	4.74	
Whitehall	82	28	53.8	5.69	
Wyoming.					
Afton	74	26	45.9	3.47	3.5
Alcova	81	25	50.0	1.66	4.5
Basin	89	27	56.4	1.98	
Bedford	74	19	43.8	3.17	.....
Border	76	24	45.2	2.61	
Buffalo	81	22	45.8	3.13	6.2
Cambria	80	21	48.1	3.73	18.0
Wyoming—Cont'd.	°	°	°	*Ins.*	*Ins.*
Chugwater	80	26	49.2	2.49	4.0
Daniel	70	17	39.4	1.99	6.5
Eatons Ranch	77	29	49.0	4.55	10.0
Elk Mountain	.....	.....	.....	2.82	8.0
Evanston	74	21	44.4	0.86	1.0
Fayette	73	20	41.6	.....	
Fontenelle	72	14	45.0	1.72	4.0
Fort Laramie	85	27	54.0	3.72	
Fort Washakie	77	23	48.4	6.31	6.0
Gillette	80	25	49.4	4.22	0.3
Granite Canyon	69	21	44.6	3.93	15.0
Green River	81	26	49.6	1.27	
Griggs	80	22	47.8	2.50	
Hatton	.....	.....	.....	2.42	12.5
Hyattville	81	24	51.8	.....	
Iron Mountain	76	19	47.6	3.63	10.0
Laramie	72	20	44.7	1.79	6.8
Leo	74	15	44.3	1.11	0.5
Little Medicine	68	10	42.0	2.32	10.0
Lolabama Ranch	69	15	40.2	2.59	12.0
Lusk	81	23	47.5	4.40	4.2
Marquette	76	22	46.1	3.51	12.0
Meeteetse	75	19	45.3	4.10	9.0
Moore	77	24	47.4	3.76	6.0
Moorcroft	83	23	48.8	2.29	
Phillips	82	24	50.4	3.47	.....
Pine Bluff	82	23	51.4	5.52	.....
Rambler	.....	.....	.....	4.25	39.7
Rock Springs	78	23	51.6	.....	.....
Sheridan	80	25	48.9	3.73	
South Pass City	77[h]	17	40.2[e]	3.30	22.0
Thayne	76	19	45.2	3.00	2.4
Torrington	89	23	53.2	3.21	
Wells	66	18	40.4	3.55	4.0
Wilson	72	23	44.4	2.50	
Yellowstone Pk. (C. H)	67[d]	18[d]	36.2[d]	2.07	13.5
Yellowstone Pk. (Foun'n)	65	20	39.3	.....	.....
Yellowstone Pk. (Lake)	59	13	35.6	2.16	.....
Yellowstone Pk. (U. Ba'n)	72	11	39.2	3.90	.....
Yellowstone Pk. (Soda B.)	74	16	42.2	4.03	.....
Porto Rico.					
Adjuntas	87	53	71.0	5.77	
Agua Buenas	.....	.....	.....	5.59	
Aguirre	98	62	80.0	3.23	
Aibonito	85	57	72.6	6.01	
Arecibo	90	64	76.6	4.88	
Barros	87	62	74.2	4.88	
Bayamon	90	61	76.8	7.24	
Caguas	90	62	76.4	4.67	
Canovanas	94	70	79.0	10.25	
Cidra	89	55	72.6	4.25	
Coloso	90	66	78.3	10.30	
Fajardo	89	71[e]	79.8[b]	8.97	
Guanica	93	63	77.7	1.28	
Hacienda Josefa	.....	.....	.....	5.56	
Humacao	88	74	80.6	12.90	
Ingenio	.....	.....	.....	8.47	
Isabela	90	68	77.6	4.82	
Juana Diaz	90	67	78.9	2.02	
La Carmelita	85	60	73.1	9.09	
La Ysolina	89	62	75.1	6.71	
Lares	90	60	75.4	10.76	
Las Cruces	85	61	70.3	6.59	
Las Marias	88	62	75.6	12.75	
Manati	97	64	78.5	3.52	
Maunabo	91	65	78.4	9.29	
Mayaguez	91	63	77.7	11.74	
Morovis	93	55	76.1	4.88	
Rio Blanco	86	66	77.0	16.47	
Rio Piedras	.....	.....	.....	7.23	
San German	93	61	77.8	1.72	
San Lorenzo	90	64	77.3	11.29	
San Salvador	84	62	73.4	4.00	
Santa Isabel	88	65	77.5	3.54	
Vieques	94	70	79.8	3.71	
Yauco	87	66	78.9	1.68	
New Brunswick.					
St. John	68	28	46.3	2.58	

Late reports for April, 1905.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Coal Harbor	36	19	38.6	18.92	5.5
Copper Center	56	6	31.4	.....	T.
Fairbanks	60	0	36.6	0.20	2.0
Juneau	60	30	42.4	4.96	
Kenai	68	8	38.8	0.46	3.0
Ketchumstock	34	− 3	20.2	0.40	4.0
Loring	66	21	42.5	11.65	0.8
Petersburg	62	21	42.4	7.17	
Skagway	58	25	41.9	1.27	
Sunrise	57	10	36.2	3.41	19.5
Tanana	.....	2	.....	0.00	
Arizona.					
Arizona Canal Co. Dam	89	44	66.2	2.16	
California.	°	°	°	*Ins.*	*Ins.*
Berkeley	76	43	55.2	1.37	
Mohave	82	38	60.2	0.00	
Redlands	89	37	58.6	0.27	
San Miguel Island	.....	.....	.....	0.85	
West Saticoy	.....	.....	.....	0.00	
Illinois.					
Aledo	81	25	49.9	3.72	1.0
Minnesota.					
Rolling Green	72	12	44.2	2.34	3.0
Wadena	73	16	40.2	2.65	1.2
Zumbrota	73	21	43.1	.....	
Montana.					
Fort Benton	.....	.....	.....	0.94	T.
Musselshell	.....	.....	.....	0.34	3.4
New Hampshire.					
Littleton	68	17	39.0	2.19	4.5
North Dakota.					
Lamoure	.....	.....	.....	1.61	T.
Wahpeton	77	19	44.0	1.54	3.0
Ohio.					
Circleville	81	25	52.0	3.22	
South Dakota.					
Fort Meade	75	15	42.8	0.49	
Rosseau	.....	.....	.....	1.49	2.0
West Virginia.					
Parsons	82	20	48.8	2.63	8.0
Point Pleasant	86	25	55.6	3.10	T.
Terra Alta	75	16	47.1	2.59	10.5
Valley Fork[b]	83	23	55.2	2.08	T.
Wyoming.					
Yel'stone Pk (Can. Hotel)	56	−10	33.2	1.23	15.0
Mexico.					
Vera Cruz	91	60	78.8	1.02	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. + 4.
[2] Mean of 8 a. m. + 8 p. m. + 2.
[3] Mean of 7 a. m. + 7 p. m. + 2.
[4] Mean of 6 a. m. + 6 p. m. + 2.
[5] Mean of 7 a. m. + 2 p. m. + 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS, APRIL, 1905.

Georgia, Ramsey, make total precipitation 4.14 instead of 4.17.

Minnesota, Campbell, make mean temperature 41.0° instead of 41.1°.

Texas, Longview, make mean temperature 57.8° instead of 57.4°.

Utah, Aneth, make total precipitation 1.40 instead of 1.50.

Wisconsin, Minocqua, make mean temperature 40.0° instead of 39.9°.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of May, 1905.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
	Hours.	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
New England.						
Eastport, Me	15	21	12	28	s. 69 w.	17
Portland, Me	12	28	11	22	s. 34 w.	19
Concord, N. H. †	12	7	8	12	n. 39 w.	6
Northfield, Vt	23	28	11	13	s. 22 w.	5
Boston, Mass	18	17	13	31	n. 87 w.	18
Nantucket, Mass	17	26	11	26	s. 59 w.	18
Block Island, R. I	13	24	13	29	s. 56 w.	19
Providence, R. I	19	20	11	28	s. 87 w.	17
Hartford, Conn	22	29	5	15	s. 55 w.	12
New Haven, Conn	16	28	17	18	s. 5 w.	12
Middle Atlantic States.						
Albany, N. Y	16	26	9	19	s. 45 w.	14
Binghamton, N. Y. †	8	5	11	12	n. 18 w.	3
New York, N. Y	11	19	23	21	s. 14 e.	8
Harrisburg, Pa	15	19	14	23	s. 66 w.	10
Philadelphia, Pa	13	23	17	18	s. 6 w.	10
Scranton, Pa	20	25	10	27	s. 74 w.	18
Atlantic City, N. J	18	23	17	21	s. 39 w.	6
Cape May, N. J	18	24	23	10	s. 65 e.	14
Baltimore, Md	17	22	18	15	s. 31 e.	6
Washington, D. C	20	23	19	14	s. 59 e.	6
Lynchburg, Va	15	26	17	18	s. 5 w.	11
Mount Weather, Va	19	23	16	20	s. 45 w.	6
Norfolk, Va	13	30	21	12	s. 28 e.	19
Richmond, Va	16	25	19	18	s. 6 e.	9
Wytheville, Va	13	11	15	32	n. 83 w.	17
South Atlantic States.						
Asheville, N. C	18	24	15	20	s. 40 w.	8
Charlotte, N. C	11	24	20	20	s.	13
Hatteras, N. C	14	21	17	27	s. 55 w.	12
Raleigh, N. C	14	26	15	18	s. 14 w.	12
Wilmington, N. C	11	26	17	25	s. 28 w.	17
Charleston, S. C	9	33	16	17	s. 2 w.	24
Columbia, S. C	16	20	17	20	s. 37 w.	5
Augusta, Ga	15	23	17	19	s. 14 w.	8
Savannah, Ga	6	32	10	23	s. 27 w.	29
Jacksonville, Fla	9	34	19	16	s. 7 e.	25
Florida Peninsula.						
Jupiter, Fla	5	42	22	9	s. 19 e.	39
Key West, Fla	6	20	44	3	s. 71 e.	43
Tampa, Fla	14	17	31	14	s. 80 e.	17
Eastern Gulf States.						
Atlanta, Ga	10	19	19	23	s. 24 w.	10
Macon, Ga. †	10	10	7	14	w.	7
Pensacola, Fla. †	8	13	9	6	s. 31 e.	6
Birmingham, Ala. †	3	13	10	11	s. 6 w.	10
Mobile, Ala	11	39	9	15	s. 12 w.	29
Montgomery, Ala	11	26	19	17	s. 8 e.	15
Meridian, Miss. †	4	14	7	11	s. 22 w.	11
Vicksburg, Miss	13	33	16	14	s. 6 e.	20
New Orleans, La	13	38	21	2	s. 37 e.	31
Western Gulf States.						
Shreveport, La	13	33	21	9	s. 31 e.	23
Fort Smith, Ark	13	18	28	12	s. 73 e.	17
Little Rock, Ark	19	27	18	12	s. 37 e.	10
Corpus Christi, Tex	4	35	39	2	s. 50 e.	48
Fort Worth, Tex	14	34	21	8	s. 33 e.	24
Galveston, Tex	8	40	23	7	s. 27 e.	36
Palestine, Tex	11	41	16	6	s. 18 e.	32
San Antonio, Tex	8	26	42	5	s. 64 e.	41
Taylor, Tex. †	8	17	10	1	s. 45 e.	13
Ohio Valley and Tennessee.						
Chattanooga, Tenn	17	25	13	21	s. 45 w.	11
Knoxville, Tenn	18	22	21	18	s. 37 e.	5
Memphis, Tenn	12	27	23	12	s. 36 e.	19
Nashville, Tenn	15	26	14	22	s. 36 w.	18
Lexington, Ky. †	7	14	12	4	s. 49 e.	11
Louisville, Ky	19	25	16	13	s. 27 e.	7
Evansville, Ind. †	10	13	8	5	s. 45 e.	4
Indianapolis, Ind	18	25	14	18	s. 30 w.	8
Cincinnati, Ohio	19	21	23	16	s. 74 e.	7
Columbus, Ohio	18	24	18	15	s. 27 e.	7
Pittsburg, Pa	23	17	6	30	n. 76 w.	25
Parkersburg, W. Va	23	22	10	20	n. 84 w.	10
Elkins, W. Va	20	24	3	25	s. 80 w.	22
Lower Lake Region.						
Buffalo, N. Y	6	29	16	27	s. 26 w.	26
Oswego, N. Y	13	24	14	25	s. 45 w.	16
Rochester, N. Y	11	19	15	31	s. 63 w.	18
Syracuse, N. Y	20	19	6	27	n. 87 w.	21
Erie, Pa	14	20	13	27	s. 67 w.	15
Cleveland, Ohio	17	22	17	16	s. 11 e.	5
Sandusky, Ohio †	7	13	8	8	s.	6
Toledo, Ohio	13	22	18	23	s. 29 w.	11
Detroit, Mich	14	19	17	21	s. 39 w.	6
Upper Lake Region.						
Alpena, Mich	22	18	17	23	n. 56 w.	7
Escanaba, Mich	25	18	19	14	n. 36 e.	9
Grand Rapids, Mich	16	21	18	20	s. 22 w.	5
Houghton, Mich. †	9	7	12	10	n. 45 e.	3
Marquette, Mich	28	15	15	26	n. 40 w.	17
Port Huron, Mich	18	25	15	19	s. 30 w.	8
Sault Ste. Marie, Mich	16	9	18	32	n. 63 w.	16
Chicago, Ill	16	23	22	14	s. 49 e.	11
Milwaukee, Wis	21	17	20	17	n. 37 e.	5
Green Bay, Wis	19	20	23	17	s. 80 e.	6
Duluth, Minn	32	8	24	19	n. 12 e.	24
North Dakota.						
Moorhead, Minn	26	15	22	18	n. 20 e.	12
Bismarck, N. Dak	27	6	23	17	n. 16 e.	22
Devils Lake, N. Dak	22	13	19	19	n.	9
Williston, N. Dak	23	11	27	15	n. 45 e.	17
Upper Mississippi Valley.						
Minneapolis, Minn.*	10	8	9	12	n. 56 w.	4
St. Paul, Minn	22	18	18	18	n.	4
La Crosse, Wis. †	10	12	9	8	s. 27 e.	2
Madison, Wis	11	25	22	19	s. 12 e.	14
Charles City, Iowa	19	20	18	19	s. 45 w.	1
Davenport, Iowa	14	23	15	21	s. 34 w.	11
Des Moines, Iowa	19	21	19	18	s. 27 e.	2
Dubuque, Iowa	18	22	19	16	s. 37 e.	5
Keokuk, Iowa	14	23	22	18	s. 24 e.	10
Cairo, Ill	15	32	17	12	s. 16 e.	18
La Salle, Ill. †	7	9	10	10	s.	2
Peoria, Ill	8	13	11	5	s. 50 e.	8
Springfield, Ill	16	28	18	14	s. 18 e.	13
Hannibal, Mo. †	8	8	10	12	w.	2
St. Louis, Mo	9	24	28	13	s. 45 e.	21
Missouri Valley.						
Columbia, Mo. *	5	12	11	7	s. 30 e.	8
Kansas City, Mo	20	19	20	16	n. 76 e.	4
Springfield, Mo	13	27	21	15	s. 23 e.	15
Topeka, Kans.*	6	13	6	9	s. 23 w.	8
Lincoln, Nebr	17	23	21	14	s. 49 e.	9
Omaha, Nebr	21	25	16	15	s. 14 e.	4
Valentine, Nebr	24	16	19	15	n. 27 e.	9
Sioux City, Iowa †	12	12	6	6	......	......
Pierre, S. Dak	25	17	19	19	n.	8
Huron, S. Dak	21	16	20	19	n. 11 e.	5
Yankton, S. Dak. †	12	7	8	11	n. 31 w.	6
Northern Slope.						
Havre, Mont	21	4	28	20	n. 25 e.	19
Miles City, Mont	23	11	15	24	n. 37 w.	15
Helena, Mont	17	13	10	38	n. 82 w.	28
Kalispell, Mont	17	19	7	28	s. 85 w.	27
Rapid City, S. Dak	20	13	17	23	n. 41 w.	9
Cheyenne, Wyo	21	21	14	17	w.	3
Lander, Wyo	24	14	11	25	n. 54 w.	17
Yellowstone Park, Wyo	24	21	7	32	n. 83 w.	24
North Platte, Nebr	19	18	16	19	n. 72 w.	3
Middle Slope.						
Denver, Colo	22	18	17	15	n. 27 e.	4
Pueblo, Colo	17	18	24	20	s. 76 e.	4
Concordia, Kans	15	22	20	16	s. 30 e.	8
Dodge, Kans	15	25	22	12	s. 45 e.	14
Wichita, Kans	17	25	21	11	s. 51 e.	13
Oklahoma, Okla	18	27	23	9	s. 51 e.	17
Southern Slope.						
Abilene, Tex	6	35	25	7	s. 32 e.	34
Amarillo, Tex	11	31	24	12	s. 31 e.	23
Roswell, N. Mex	17	26	16	17	s. 6 w.	9
Southern Plateau.						
El Paso, Tex	18	4	9	42	n. 67 w.	36
Santa Fe, N. Mex	12	26	22	18	s. 16 e.	15
Flagstaff, Ariz	19	24	4	32	s. 80 w.	28
Phoenix, Ariz	14	11	23	25	n. 34 w.	4
Yuma, Ariz	9	22	8	37	s. 66 w.	32
Independence, Cal	19	23	15	23	s. 63 w.	9
Middle Plateau.						
Carson City, Nev	18	20	3	34	s. 87 w.	31
Winnemucca, Nev	20	21	13	29	s. 87 w.	16
Modena, Utah	7	17	5	44	s. 76 w.	40
Salt Lake City, Utah	12	26	24	16	s. 30 e.	16
Durango, Colo	19	15	6	36	n. 82 w.	30
Grand Junction, Colo	21	19	22	18	n. 63 e.	4
Northern Plateau.						
Baker City, Oreg	22	25	14	20	s. 63 w.	7
Boise, Idaho	18	17	14	24	n. 84 w.	10
Lewiston, Idaho †	3	5	22	4	s. 84 e.	18
Pocatello, Idaho	3	28	28	18	s. 22 e.	27
Spokane, Wash	22	21	26	9	n. 87 e.	17
Walla Walla, Wash	11	35	19	9	s. 23 e.	26
North Pacific Coast Region.						
North Head, Wash	30	11	4	36	n. 59 w.	37
Port Crescent, Wash.*	12	3	6	18	n. 53 w.	15
Seattle, Wash	18	24	19	11	s. 53 e.	10
Tacoma, Wash	22	18	7	27	n. 79 w.	20
Tatoosh Island, Wash	11	17	14	34	s. 73 w.	21
Portland, Oreg	15	20	10	31	s. 77 w.	22
Roseburg, Oreg	31	9	18	17	n. 3 e.	22
Middle Pacific Coast Region.						
Eureka, Cal	39	10	11	13	n. 4 w.	29
Mount Tamalpais, Cal	30	12	3	37	n. 62 w.	38
Red Bluff, Cal	27	21	22	6	n. 69 e.	17
Sacramento, Cal	11	36	16	13	s. 7 e.	25
San Francisco, Cal	5	16	1	47	s. 77 w.	47
South Pacific Coast Region.						
Fresno, Cal	35	4	6	35	n. 43 w.	42
Los Angeles, Cal	10	15	14	36	s. 77 w.	23
San Diego, Cal	15	16	5	40	s. 88 w.	35
San Luis Obispo, Cal	21	9	3	39	n. 72 w.	38
West Indies						
Grand Turk, W. I	0	10	25	1	s. 67 e.	26
Hamilton, Bermuda	8	23	15	29	s. 43 w.	20
Havana, Cuba †	1	1	30	1	e.	29
San Juan, Porto Rico	0	18	52	1	s. 71 e.	54

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during May, 1905, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	14			0.12														0.11			
Alpena, Mich.	4			0.23														0.19			
Amarillo, Tex.	26	9:45 a. m.	7:15 p. m.	3.86	1:28 p. m.	2:06 p. m.	0.11	0.09	0.24	0.49	0.97	1.37	1.68	1.80	1.87						
					5:55 p. m.	6:40 p. m.	2.36	0.17	0.50	0.92	0.97	1.00	1.05	1.10	1.24	1.37					
Asheville, N. C.	4	7:22 p. m.	10:00 p. m.	1.04	7:25 p. m.	7:55 p. m.	T.	0.19	0.43	0.53	0.68	0.90	0.95								
Do.	27-28	8:05 p. m.	D. N.	1.50	9:30 p. m.	10:11 p. m.	0.23	0.08	0.25	0.45	0.62	0.79	0.92	1.02	1.07						
Atlanta, Ga.	22	3:35 p. m.	5:00 p. m.	0.76	4:22 p. m.	4:43 p. m.	0.03	0.08	0.23	0.51	0.72										
Atlantic City, N. J.	15-16	11:07 p. m.	D. N.	0.83	11:25 p. m.	11:45 p. m.	0.07	0.05	0.36	0.58	0.69										
Augusta, Ga.	26			0.46														0.33			
Baltimore, Md.	14			0.65														0.27			
Binghamton, N. Y.	17			0.44														0.40			
Birmingham, Ala.	6-7	11:14 p. m.	1:30 a. m.	0.90	11:27 p. m.	11:52 p. m.	0.05	0.05	0.24	0.51	0.65	0.71									
Do	20	3:44 p. m.	5:50 p. m.	1.26	3:54 p. m.	4:29 p. m.	0.05	0.09	0.10	0.23	0.61	0.83	1.02	1.08							
Do	22	12:50 p. m.	2:10 p. m.	0.70	1:33 p. m.	1:50 p. m.	0.04	0.25	0.47	0.62											
Bismarck, N. Dak.	9-10			0.56														0.15			
Block Island, R. I.	14	11:05 a. m.	2:40 p. m.	1.20	12:36 p. m.	1:31 p. m.	0.23	0.06	0.09	0.16	0.20	0.31	0.34	0.39	0.44	0.51	0.69				
Boise, Idaho.	27			0.33														0.25			
Boston, Mass.	18			0.50														0.31			
Buffalo, N. Y.	25-26			1.20														0.24			
Cairo, Ill.	6	12:30 a. m.	10:00 a. m.	1.71	4:54 a. m.	5:15 a. m.	0.27	0.17	0.43	0.52	0.57										
Charleston, S. C.	10-11	D. N.	D. N.	1.20	11:45 p. m.	12:45 a. m.	0.02	0.21	0.39	0.51	0.53	0.57	0.61	0.73	0.81	0.83	0.84	0.99			
Do	31	5:17 p. m.	6:30 p. m.	1.12	5:17 p. m.	6:12 p. m.	0.00	0.17	0.26	0.43	0.68	0.71	0.78	0.85	0.89	0.97	1.03	1.11			
Charlotte, N. C.	7	12:20 a. m.	D. N.	1.43	12:33 a. m.	1:48 a. m.	T	0.24	0.31	0.38	0.54	0.56	0.58	0.70	0.74	0.95	1.04	1.14	1.36		
Chattanooga, Tenn.	5	3:10 a. m.	5:08 a. m.	0.58	4:06 a. m.	4:30 a. m.	0.06	0.06	0.22	0.35	0.43	0.48									
Chicago, Ill.	11	9:55 a. m.	1:00 p. m.	1.36	11:15 a. m.	11:50 a. m.	0.07	0.16	0.53	0.77	0.98	1.09	1.14	1.20							
Cincinnati, Ohio.	11	5:25 p. m.	9:45 p. m.	1.61	5:38 p. m.	5:59 p. m.	0.03	0.24	0.52	0.63	0.87										
Cleveland, Ohio.	11	10:12 a. m.	7:15 p. m.	1.50	10:47 a. m.	11:12 a. m.	0.03	0.25	0.39	0.50	0.55	0.60									
Columbia, Mo.	11	2:00 p. m.	4:20 p. m.	1.46	2:20 p. m.	2:47 p. m.	0.01	0.15	0.23	0.46	0.77	0.93									
Columbia, S. C.	3			0.48						0.41											
Columbus, Ohio.	14			0.45							0.43										
Concord, N. H.	15-16	5:00 p. m.	4:45 a. m.	1.00	10:23 p. m.	10:59 p. m.	0.11	0.10	0.28	0.42	0.51	0.62	0.70	0.75							
Corpus Christi, Tex.	14	2:45 p. m.	8:52 p. m.	1.97	5:20 p. m.	5:50 p. m.	0.03	0.13	0.29	0.72	0.98	1.13	1.24								
Do.	30	8:53 a. m.	11:03 a. m.	1.24	10:04 a. m.	10:41 a. m.	0.10	0.39	0.52	0.55	0.56	0.57	0.80	1.08	1.12						
Davenport, Iowa.	11	7:55 a. m.	9:30 a. m.	0.80	8:06 a. m.	8:25 a. m.	T.	0.22	0.47	0.59	0.65										
Denver, Colo.	22			0.46					0.35												
Des Moines, Iowa.	11			0.85														0.63			
Detroit, Mich.	11			0.45					0.36												
Dodge, Kans.	18-19	8:15 p. m.	8:37 a. m.	1.70	10:39 p. m.	10:56 p. m.	0.10	0.11	0.30	0.53											
Do.	28	D. N.	6:10 a. m.	1.57	4:29 a. m.	5:15 a. m.	0.06	0.08	0.20	0.42	0.60	0.80	1.00	1.13	1.28	1.42					
Dubuque, Iowa.	11			0.69														0.42			
Duluth, Minn.	11-12			0.41														0.25			
Eastport, Me.	18			0.40														0.37			
Elkins, W. Va.	11-12			1.58														0.61			
Erie, Pa.	25-26			1.32														0.26			
Escanaba, Mich.	3			0.72														0.46			
Evansville, Ind.	13	5:40 a. m.	7:12 a. m.	0.67	6:03 a. m.	6:24 a. m.	0.03	0.13	0.27	0.43	0.54										
Fort Smith, Ark.	6			0.55						0.52											
Fort Worth, Tex.	11	10:22 a. m.	11:15 a. m.	1.40	10:38 a. m.	11:15 a. m.	0.10	0.06	0.21	0.47	0.89	1.02	1.22	1.30							
Do	12	11:25 a. m.	3:00 p. m.	1.16	1:26 p. m.	1:40 p. m.	0.11	0.31	0.77	0.82											
Galveston, Tex.	25			0.50									0.40								
Grand Rapids, Mich.	4	12:20 p. m.	1:20 p. m.	0.80	12:40 p. m.	1:02 p. m.	T.	0.07	0.26	0.59	0.79										
Green Bay, Wis.	10			0.90														0.23			
Hannibal, Mo.	11			0.42					0.36												
Harrisburg, Pa.	14			0.29									0.28								
Hatteras, N. C.	17	3:10 a. m.	5:10 a. m.	0.55	3:10 a. m.	4:15 a. m.	0.00	0.28	0.31	0.34	0.49	0.66	0.88	1.05	1.09	1.13	1.20	1.45			
Do	22	3:30 p. m.	8:50 p. m.	1.36	7:35 p. m.	7:55 p. m.	0.45	0.09	0.24	0.44	0.75										
Do	27	4:10 a. m.	6:50 a. m.	1.45	4:30 a. m.	5:25 a. m.	0.02	0.12	0.17	0.25	0.26	0.35	0.58	0.67	0.73	0.84	0.93	1.12			
Huron, S. Dak.	3	10:35 a. m.	4:20 p. m.	1.25	3:33 p. m.	4:13 p. m.	0.53	0.16	0.19	0.27	0.37	0.51	0.59	0.64	0.71						
Do	9-10	4:15 p. m.	7:30 a. m.	1.65	4:50 p. m.	5:30 p. m.	0.11	0.06	0.35	0.48	0.53	0.55	0.58	0.68	0.75						
Indianapolis, Ind.	11			1.95														0.56			
Jacksonville, Fla.	30	6:55 p. m.	11:10 p. m.	1.31	7:57 p. m.	8:42 p. m.	0.11	0.17	0.25	0.35	0.38	0.49	0.56	0.66	0.78	0.90					
Do	31	5:30 p. m.	7:15 p. m.	1.18	5:52 p. m.	6:12 p. m.	0.07	0.09	0.29	0.81	1.10										
Jupiter, Fla.	26	4:10 p. m.	6:10 p. m.	0.70	4:43 p. m.	5:06 p. m.	0.67	0.08	0.25	0.47	0.62	0.67									
Kalispell, Mont.	30	3:25 p. m.	4:05 p. m.	0.68	3:38 p. m.	3:57 p. m.	0.04	0.16	0.29	0.44	0.61										
Kansas City, Mo.	24-25	4:02 p. m.	4:15 a. m.	3.08	6:40 p. m.	7:14 p. m.	0.47	0.08	0.18	0.40	0.70	1.00	1.19	1.24							
Key West, Fla.	17			0.20				0.20													
Knoxville, Tenn.	15-16			1.46														0.46			
La Crosse, Wis.	9-10			1.36														*			
La Salle, Ill.	10-11	8:30 p. m.	6:50 a. m.	2.09	8:47 p. m.	9:01 p. m.	T.	0.27	0.90	1.17											
					9:42 p. m.	9:57 p. m.	1.24	0.09	0.33	0.61											
Do	11	9:55 a. m.	11:05 a. m.	0.85	10:18 a. m.	10:38 a. m.	0.03	0.19	0.41	0.70	0.82										
Lexington, Ky.	10	8:08 a. m.	9:20 a. m.	1.30	8:45 a. m.	9:15 a. m.	0.05	0.19	0.36	0.49	0.70	1.05	1.25								
Lincoln, Nebr.	10-11	10:55 p. m.	5:00 a. m.	1.48	12:25 a. m.	1:08 a. m.	0.13	0.21	0.51	0.56	0.59	0.65	0.71	0.82	1.00	1.05					
Do	28	4:50 p. m.	7:40 p. m.	1.59	7:00 p. m.	7:40 p. m.	0.24	0.10	0.25	0.45	0.70	0.95	1.20	1.30	1.35						
Little Rock, Ark.	12-13	3:10 p. m.	D. N.	3.52	3:18 p. m.	4:13 p. m.	0.02	0.14	0.37	0.42	0.50	0.61	0.68	0.77	0.88	1.06	1.19				
					11:47 p. m.	12:15 a. m.	1.68	0.12	0.24	0.65	0.97	1.10	1.16								
Los Angeles, Cal.	2			0.41														0.32			
Louisville, Ky.	13-14			2.64														1.12			
Lynchburg, Va.	11-12	9:20 p. m.	2:45 a. m.	2.10	11:10 p. m.	11:22 p. m.	0.54	0.17	8.53	0.61											
					1:52 a. m.	2:06 a. m.	1.40	0.37	0.65												
Macon, Ga.	15-16			1.20														0.61			
Memphis, Tenn.	12-13	2:30 p. m.	6:50 a. m.	3.40	3:35 a. m.	3:57 a. m.	1.16	0.20	0.46	0.74	0.90										
					4:57 a. m.	5:22 a. m.	2.21	0.09	0.29	0.53	0.71	0.96									
Meridian, Miss.	25-26	7:10 p. m.	D. N.	2.83	8:55 p. m.	9:20 p. m.	0.58	0.05	0.34	0.65	0.91	0.96									
					11:05 p. m.	11:35 p. m.	1.59	0.16	0.35	0.73	0.90	0.98	1.14								
Milwaukee, Wis.	13-14			1.38														0.70			
Minneapolis, Minn.	3-4	10:55 p. m.	D. N.	0.63	11:14 p. m.	11:54 p. m.	0.01	0.07	0.12	0.14	0.16	0.23	0.34	0.55	0.60						
Montgomery, Ala.	8	10:20 a. m.	12:10 p. m.	0.99	10:21 a. m.	10:50 a. m.	T.	0.27	0.53	0.55	0.57	0.62	0.73	0.78							
Do	21-22	7:45 p. m.	12:15 a. m.	1.57	11:17 p. m.	11:51 p. m.	0.55	0.14	0.25	0.34	0.47	0.69	0.86	0.96							
Do	30	10:05 a. m.	3:35 p. m.	3.65	10:38 a. m.	11:39 a. m.	T.	0.08	0.17	0.36	0.70	1.08	1.44	1.98	2.48	2.85	3.03	3.46			
Mount Weather, Va.	14	1:25 p. m.	5:35 p. m.	1.62	2:10 p. m.	2:23 p. m.	0.06	0.30	0.85	1.14											
Nantucket, Mass.	9	7:57 a. m.	8:35 a. m.	0.54	8:16 a. m.	8:26 a. m.	T.	0.42	0.51												
Nashville, Tenn.	6	10:24 a. m.	3:20 p. m.	1.92	2:33 p. m.	3:13 p. m.	0.78	0.13	0.37	0.59	0.72	0.86	0.93	0.98	1.11						
New Haven, Conn.	30			0.39									0.38								
New Orleans, La.	22	11:28 a. m.	1:40 p. m.	1.29	1:16 p. m.	1.34 p. m.	0.57	0.19	0.42	0.60	0.72										
New York, N. Y.	17-18			0.22														0.19			
Norfolk, Va.	30			0.43					0.34												
Northfield, Vt.	26			0.66														0.38			
North Head, Wash.	21-22			1.22														0.13			
Oklahoma, Okla.	29	5:30 p. m.	6:50 p. m.	1.94	6:02 p. m.	6:38 p. m.	T.	0.10	0.40	0.60	0.90	1.20	1.50	1.75	1.92						
Omaha, Nebr.	28	7:25 p. m.	9:05 p. m.	0.59	8:20 p. m.	8:45 p. m.	0.10	0.06	0.07	0.16	0.36	0.47									

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Palestine, Tex	7–8	9:05 p. m.	D. N.	3.33	11:24 p. m.	1:24 a. m.	0.20	0.18	0.40	0.62	0.70	0.73	0.77	0.83	0.84	0.94	1.17	1.38	2.01	2.43	2.89
Do	21–22	8:02 p. m.	D. N.	0.97	10:00 p. m.	10:55 p. m.	0.13	0.13	0.22	0.34	0.40	0.44	0.47	0.52	0.56	0.64	0.69	0.74			
Parkersburg, W. Va	11–12	2:26 p. m.	4:00 a. m.	2.84	4:32 p. m.	4:54 p. m.	0.07	0.11	0.43	0.73	0.84										
					8:01 p. m.	8:16 p. m.	1.36	0.33	0.62	0.68											
Pensacola, Fla	1–2	6:50 p. m.	3:45 a. m.	2.71	7:31 p. m.	7:54 p. m.	0.20	0.25	0.39	0.44	0.53	0.58									
					9:30 p. m.	10:09 p. m.	1.12	0.07	0.24	0.37	0.41	0.44	0.53	0.57	0.62						
Do	25	7:15 a. m.	11:00 a. m.	0.62	8 2 a. m.	8:42 a. m.	0.06	0.26	0.38	0.44	0.52										
Peoria, Ill	11	10:00 a. m.	11:43 a. m.	1.29	10:20 a. m.	10:50 a. m.	T.	0.27	0.42	0.54	0.76	1.01	1.08								
Philadelphia, Pa	16			0.28									0.28								
Pittsburg, Pa	14			0.64									0.54								
Portland, Me	15–16			1.27														0.61			
Portland, Oreg	16			0.17					0.16												
Raleigh, N. C	10	6:05 p. m.	9:30 p. m.	1.72	6:44 p. m.	7:04 p. m.	0.08	0.29	0.73	1.04	1.12										
Do	12	3:35 p. m.	6:30 p. m.	1.02	3:45 p. m.	4:05 p. m.	T.	0.35	0.66	0.81	0.86										
Do	16	5:07 a. m.	5:54 a. m.	1.03	5:14 a. m.	5:39 a. m.	0.02	0.07	0.20	0.40	0.72	0.93									
Richmond, Va	12			0.93									0.45								
Rochester, N. Y	26			0.71														0.24			
Sacramento, Cal	7			1.19														0.41			
St. Louis, Mo	4	2:00 p. m.	3:54 p. m.	1.26	2:31 p. m.	3:26 p. m.	0.19	0.19	0.36	0.38	0.39	0.41	0.49	0.53	0.58	0.69	0.89	1.07			
		8:48 p. m.	9:45 p. m.	0.61	8:48 p. m.	9:15 p. m.	0.00	0.14	0.23	0.50	0.55	0.60									
St. Paul, Minn	3–4			0.50														0.48			
Salt Lake City, Utah	2–3			1.42														0.28			
San Antonio, Tex	14	9:45 a. m.	6:15 p. m.	2.65	9:51 a. m.	10:36 a. m.	0.01	0.11	0.42	0.73	0.91	0.97	0.99	1.09	1.40	1.55					
Do	24	2:15 a. m.	5:20 a. m.	0.87	3:03 a. m.	3:23 a. m.	0.06	0.12	0.30	0.49	0.63	0.68									
San Diego, Cal	2			0.19														0.11			
Sandusky, Ohio	11	8:48 a. m.	1:30 p. m.	1.69	12:06 p. m.	12:31 p. m.	0.68	0.10	0.22	0.48	0.71	0.81									
San Francisco, Cal	1–2			1.18														0.34			
Savannah, Ga	7	3:47 p. m.	7:05 p. m.	2.09	4:10 p. m.	5:15 p. m.	0.06	0.06	0.15	0.24	0.43	0.69	0.87	0.95	1.18	1.53	1.63	1.85			
Scranton, Pa	16			0.20				0.13													
Seattle, Wash	21–22			0.72														0.12			
Shreveport, La	7	3:30 a. m.	4:30 p. m.	4.64	5:52 a. m.	6:53 a. m.	0.07	0.12	0.26	0.32	0.45	0.47	0.51	0.63	0.64	0.69	0.82	1.01			
					8:17 a. m.	10:06 a. m.	1.28	0.06	0.14	0.25	0.32	0.41	0.51	0.62	0.69	0.85	0.95	1.29	1.72	2.21	2.35
Do	21–22	9:00 p. m.	2:15 a. m.	1.66	11:50 p. m.	12:40 a. m.	0.03	0.06	0.24	0.27	0.31	0.37	0.45	0.75	1.03	1.22	1.34				
Spokane, Wash	16			0.19					0.18												
Springfield, Ill	25			0.39														0.39			
Springfield, Mo	13	11:32 a. m.	1:45 p. m.	1.20	12:05 p. m.	12:40 p. m.	0.12	0.07	0.13	0.23	0.39	0.58	0.78	0.94							
Syracuse, N. Y	14	3:40 p. m.	5:48 p. m.	0.58	4:40 p. m.	5:00 p. m.	0.05	0.19	0.37	0.45	0.51										
Tampa, Fla	3	5:25 p. m.	6:05 p. m.	0.67	5:28 p. m.	5:47 p. m.	0.01	0.19	0.47	0.56	0.65										
Taylor, Tex	23	6:30 p. m.	D. N.	1.28	7:54 p. m.	8:34 p. m.	0.03	0.20	0.46	0.59	0.74	0.90	1.02	1.06	1.15						
Toledo, Ohio	6			0.76														0.63			
Topeka, Kans	15	1:05 p. m.	1:32 p. m.	0.81	1:13 p. m.	1:31 p. m.	0.02	0.18	0.45	0.78											
Do	24–25	6:00 p. m.	3:30 a. m.	3.09	6:33 p. m.	8:08 p. m.	0.04	0.14	0.25	0.38	0.55	0.67	0.76	0.80	0.86	0.93	0.99	1.26	1.54		
Vicksburg, Miss	14			0.70														0.43			
Washington, D. C	14	3:10 p. m.	6:00 p. m.	1.25	3:18 p. m.	3:43 p. m.	T.	0.04	0.27	0.54	0.76	0.81									
Do	31	2:57 p. m.	6:55 p. m.	0.78	3:50 p. m.	4:15 p. m.	0.06	0.05	0.18	0.33	0.44	0.49									
Wichita, Kans	13	6:15 a. m.	8:46 a. m.	0.72	7:56 a. m.	8:23 a. m.	0.05	0.09	0.13	0.16	0.24	0.43	0.63								
Williston, N. Dak	15			0.28														0.19			
Wilmington, N. C	3			1.93														0.64			
Wytheville, Va	6	12:45 p. m.	2:15 p. m.	0.89	1:05 p. m.	1:37 p. m.	0.15	0.10	0.20	0.30	0.40	0.53	0.69	0.73							
Do	13	3:45 p. m.	6:00 p. m.	1.30	4:00 p. m.	5:46 p. m.	0.03	0.06	0.13	0.18	0.21	0.34	0.42	0.56	0.57	0.58	0.58	0.65	0.93	1.14	1.27
Yankton, S. Dak	8–9			1.67														0.65			
Havana, Cuba	8			0.32					0.31												
San Juan, Porto Rico	12	3:25 p. m.	4:50 p. m.	0.74	3:25 p. m.	3:50 p. m.	0.00	0.14	0.33	0.40	0.50	0.63									
Do	16	12:15 p. m.	1:05 p. m.	0.53	12:28 p. m.	12:48 p. m.	0.04	0.21	0.36	0.41	0.47										

*Self-register not working

TABLE V.—*Data furnished by the Canadian Meteorological Service, May, 1905.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins.
St. Johns, N. F	29.66	29.80	—.18	41.9	− 1.0	49.9	33.9	3.57	−0.09	
Sydney, C. B. I	29.87	29.91	—.06	45.3	+ 0.1	55.6	35.0	3.36	−0.41	
Halifax, N. S	29.83	29.94	—.04	49.4	+ 1.0	59.1	39.6	3.21	−1.05	
Grand Manan, N. B	29.83	29.90	—.07	47.9	0.0	56.0	39.8	3.10	−0.51	
Yarmouth, N. S	29.88	29.95	—.03	47.0	− 0.6	54.5	39.4	3.60	−0.20	
Charlottetown, P. E. I	29.86	29.90	—.06	46.8	− 0.1	55.3	38.3	3.42	+0.51	1.6
Chatham, N. B	29.85	29.87	—.08	49.8	+ 1.3	61.4	38.1	3.76	+0.55	
Father Point, Que	29.85	29.87	—.06	45.1	+ 1.1	52.5	37.7	2.57	−0.01	
Quebec, Que	29.57	29.89	—.05	50.0	+ 0.1	59.9	40.1	3.13	+0.05	0.2
Montreal, Que	29.70	29.91	—.03	53.9	− 0.8	62.3	45.5	2.45	−0.50	T.
Rockliffe, Ont	29.32	29.85	—.08	50.6	− 1.7	63.8	37.4	4.15	+1.64	
Ottawa, Ont	29.57	29.89	—.05	54.7	− 0.2	64.6	44.9	1.66	−0.93	
Kingston, Ont	29.64	29.95	—.01	51.1	− 1.8	59.4	42.7	2.99	+0.31	T.
Toronto, Ont	29.58	29.96	—.02	52.7	− 0.5	62.5	42.9	3.24	+0.20	
White River, Ont	28.62	29.94	—.01	44.3	− 1.4	57.3	31.2	2.16	+0.21	1.0
Port Stanley, Ont	29.33	29.97	.00	51.4	− 1.7	60.2	42.5	3.72	+0.54	
Saugeen, Ont	29.25	29.96	.00	50.6	− 0.1	60.9	40.3	4.53	+2.09	
Parry Sound, Ont	29.20	29.93	.00	50.6	− 0.5	61.0	40.2	3.90	+0.97	
Port Arthur, Ont	29.23	29.94	—.02	45.8	− 0.1	56.5	35.1	2.14	−0.01	
Winnipeg, Man	29.08	29.91	—.05	50.4	− 1.2	62.5	38.3	3.35	+1.07	5.4
Minnedosa, Man	28.13	29.94	—.02	49.6	+ 1.2	61.4	37.8	2.89	+1.44	7.0
Qu'Appelle, Assin	27.68	29.93	—.01	47.7	− 2.1	59.6	35.9	4.79	+3.14	10.6
Medicine Hat, Assin	27.65	29.92	+.03	52.3	− 1.8	64.7	39.8	1.13	−0.18	
Swift Current, Assin	27.38	29.95	+.03	49.2	− 1.5	60.7	37.7	3.75	+1.99	6.6
Calgary, Alberta	26.39	29.92	+.04	47.4	− 1.6	61.3	33.5	2.06	+0.29	2.5
Banff, Alberta	25.34	29.93	+.05	43.7	− 3.3	56.3	31.2	3.06	+1.02	3.1
Edmonton, Alberta	27.62	29.90	+.02	52.0	+ 1.2	67.3	36.7	1.61	+0.06	
Prince Albert, Sask	28.36	29.91	—.04	50.2	+ 2.6	62.3	38.1	1.56	+0.30	
Battleford, Sask	28.28	30.02	+.10	50.5	− 0.5	62.9	38.1	1.82	+0.20	
Kamloops, B. C										
Victoria, B. C	29.89	29.99	—.01	52.6	+ 0.1	59.2	45.9	2.83	+1.35	
Barkerville, B. C	25.62	29.90	+.06	45.9	+ 0.4	59.8	32.0	2.34	−0.18	
Hamilton, Bermuda	29.99	30.15	+.09	71.9	+ 2.5	77.1	66.6	6.16	+1.50	

TABLE VI.—*Heights of rivers referred to zeros of gages, May, 1905.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Milk River.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Havre, Mont	237	9	3.8	1, 23	3.4	18, 21, 22	3.6	0.4
Musselshell River.								
Musselshell, Mont	87	9	0.4	31	0.0	7–14	0.3	0.4
Yellowstone River.								
Billings, Mont	330	8	3.2	31	0.4	1, 2	1.5	2.8
Glendive, Mont	78	17	5.0	27	1.6	1, 4	3.1	3.4
Cheyenne River.								
Rousseau, S. Dak	7	9	7.0	7	— 0.1	1, 2	2.5	7.1
James River.								
Lamoure, N. Dak	330	14	— 1.2	20, 21, 24-27	— 2.1	1–4	–1.5	0.9
Huron, S. Dak	139	9	3.7	20–23	0.6	1–4	2.1	3.1
Big Blue River.								
Blue Rapids, Kans	47	14	18.0	31	5.4	7–12	8.2	12.6
Republican River.								
Clay Center, Kans	42	18	14.0	31	7.3	8, 10, 11	8.7	6.7
Solomon River.								
Beloit, Kans	75	16	16.2	17	0.6	9	3.8	15.6
Smoky Hill River.								
Lindsborg, Kans	109	20	16.8	11	2.3	24	4.7	14.5
Abilene, Kans	45	22	10.6	26	1.6	4, 6–8	5.0	9.0
Kansas River.								
Manhattan, Kans	116	18	10.6	31	3.5	7–9	6.0	7.1
Topeka, Kans	87	21	15.7	26	6.9	8	9.6	8.8
Osage River.								
Bagnell, Mo	70	28	11.5	16	2.3	7	5.7	9.2
Gasconade River.								
Arlington, Mo	98	16	4.5	24	0.8	4–7	2.1	3.7
Missouri River.								
Townsend, Mont	2,504	11	4.0	1, 2	3.5	30, 31	3.7	0.5
Fort Benton, Mont	2,285	12	1.8	23, 24	1.4	9-11, 17-19	1.6	0.4
Wolf Point, Mont	1,952	17	0.0	30, 31	— 1.2	1	–0.7	1.2
Bismarck, N. Dak	1,309	14	2.8	31	0.1	5	1.3	2.7
Pierre, S. Dak	1,114	14	5.7	9	2.5	1, 2	4.0	3.2
Sioux City, Iowa	784	19	8.5	9	5.0	3, 4	7.0	3.5
Blair, Nebr	705	15	8.5	14	5.6	4	7.0	2.9
Omaha, Nebr	669	10	8.4	16	5.9	5	7.0	2.5
Plattsmouth, Nebr	641	17	7.2	15	3.8	3	5.3	3.4
St. Joseph, Mo	481	10	7.5	17	2.9	5, 6	4.8	4.6
Kansas City, Mo	388	21	17.0	17	8.7	7	12.2	8.3
Glasgow, Mo	231	18	13.4	18	7.0	8	10.1	6.4
Boonville, Mo	199	20	15.6	18	8.3	9, 10	11.3	7.3
Hermann, Mo	103	24	16.1	19	8.2	8, 9	11.6	7.9
Minnesota River.								
Mankato, Minn	127	18	9.9	18, 19	2.8	1, 2	6.4	7.1
St. Croix River.								
Stillwater, Minn	23	11	12.1	18, 19	4.4	1	9.2	7.7
Chippewa River.								
Chippewa Falls, Wis	75	16	8.6	17	2.2	1	4.5	6.4
Red Cedar River.								
Cedar Rapids, Iowa	77	14	7.9	20	3.5	8	5.0	4.4
Iowa River.								
Iowa City, Iowa	57	......	8.0	24	0.5	8	4.5	7.5
Des Moines River.								
Des Moines, Iowa	205	19	10.5	19	3.3	6–9	6.2	7.2
Illinois River.								
Peoria, Ill	135	14	17.9	18, 19	12.7	11	15.3	5.2
Beardstown, Ill	70	12	13.8	26, 27	11.6	13, 14	12.5	2.2
Red Bank Creek.								
Brookville, Pa	42	8	1.0	1–31	1.0	1–31	1.0	0.0
Clarion River.								
Clarion, Pa	32	10	3.0	16	1.3	31	2.0	1.7
Conemaugh River.								
Johnstown, Pa	64	7	4.7	15	1.7	5, 6, 9, 10	2.3	3.0
Allegheny River.								
Warren, Pa	177	14	2.1	19	0.9	29–31	1.4	1.2
Franklin, Pa	114	15	3.4	8	1.4	26	2.2	2.0
Parker, Pa	73	20	3.1	13	1.3	28	2.2	1.8
Freeport, Pa	29	20	8.0	15	2.9	28	4.8	5.1
Springdale, Pa	17	27	11.5	15, 16	7.6	28	9.0	3.9
Cheat River.								
Rowlesburg, W. Va	36	14	7.6	12	1.8	10, 11	3.0	5.8
Youghiogheny River.								
Confluence, Pa	59	10	3.2	15	1.0	31	1.5	2.2
West Newton, Pa	15	23	4.6	16	1.0	30, 31	2.1	3.6
Monongahela River.								
Weston, W. Va	161	18	13.8	12	— 0.2	28, 29	1.0	14.0
Fairmont, W. Va	119	25	21.2	13	14.4	28–30	15.8	6.8
Greensboro, Pa	81	18	15.6	13	6.7	31	8.8	8.9
Lock No. 4, Pa	40	28	19.0	13	6.5	30, 31	9.2	12.5
Beaver River.								
Ellwood Junction, Pa	10	14	6.0	15	1.0	26	3.2	5.0
Muskingum River.								
Zanesville, Ohio	70	25	18.5	13	8.2	6–8, 10	11.0	10.3
Little Kanawha River.								
Glenville, W. Va	77	20	21.0	12	— 1.0	29	2.0	22.0
Creston, W. Va	38	20	20.0	12	2.9	29, 30	5.1	17.1
New River.								
Radford, Va	155	14	6.6	13	— 0.2	30	1.7	6.8
Hinton, W. Va	95	14	10.3	13	1.7	4, 5	3.7	8.6
Great Kanawha River.								
Charleston, W. Va	58	30	28.0	13	4.2	26	8.7	23.8
Scioto River.								
Columbus, Ohio	110	17	14.0	12	2.9	8–10	4.9	11.1
Licking River.								
Falmouth, Ky	30	25	20.2	13	1.5	27–29	5.8	18.7
Miami River.								
Dayton, Ohio	77	18	9.3	12	1.2	11	3.2	8.1
Kentucky River.								
Jackson, Ky	287	24	10.0	13	5.3	31	6.6	4.7
Beattyville, Ky	254	30	8.8	14	1.1	27–29	2.4	7.7
High Bridge, Ky	117	17	15.6	15	9.7	29	11.4	5.9
Frankfort, Ky	65	31	10.7	15	6.4	29	7.7	4.3
Wabash River.								
Terre Haute, Ind	171	16	20.4	18	3.6	27–29	9.2	16.8
Wabash River—Cont'd.	Miles.	Feet.	Feet.		Feet.		Feet.	Feet.
Mount Carmel, Ill	75	15	16.2	19	5.6	30, 31	10.5	10.6
Cumberland River.								
Burnside, Ky	518	50	13.2	18	1.6	31	4.8	11.6
Celina, Tenn	383	45	14.2	19	4.3	13	7.3	9.9
Carthage, Tenn	308	40	16.3	25	3.8	13	7.1	12.5
Nashville, Tenn	193	40	19.9	26	9.6	14	12.5	10.3
Clarksville, Tenn	126	42	25.0	25	8.6	13, 14	14.2	16.4
Powell River.								
Tazewell, Tenn	44	20	6.2	17	0.8	30, 31	2.1	5.4
Clinch River.								
Speers Ferry, Va	156	20	6.5	17	0.1	30, 31	1.4	6.4
Clinton, Tenn	52	25	15.0	17, 18	4.9	31	7.7	10.1
South Fork Holston River.								
Bluff City, Tenn	35	15	4.2	13	1.0	29, 30	2.1	3.2
Holston River.								
Rotherwood, Tenn	142	14	4.9	14	0.9	30	1.9	4.0
Rogersville, Tenn	103	14	5.9	17	2.2	5, 6, 30, 31	3.3	3.7
French Broad River.								
Asheville, N. C	144	6	3.0	28	— 0.3	3	0.7	3.3
Leadvale, Tenn	70	15	4.5	16	0.0	3, 4	1.4	4.5
Dandridge, Tenn	46	15	6.1	17	1.3	4, 5	2.7	4.8
Little Tennessee River.								
McGhee, Tenn	17	20	6.4	17	3.6	15	4.5	2.8
Hiwassee River.								
Charleston, Tenn	18	22	8.8	24	2.1	31	3.6	6.7
Tennessee River.								
Knoxville, Tenn	635	29	10.1	17	1.9	5	4.3	8.2
Loudon, Tenn	590	25	7.8	18	1.9	6	3.8	5.9
Kingston, Tenn	556	25	9.9	17	2.9	6	4.8	7.0
Chattanooga, Tenn	452	33	13.7	18	5.1	7	7.8	8.6
Bridgeport, Ala	402	24	11.0	19	3.5	7	6.2	7.5
Guntersville, Ala	349	31	15.6	19	6.8	8	10.4	8.8
Florence, Ala	255	16	10.2	25	4.2	17	6.4	6.0
Riverton, Ala	225	26	15.6	26	6.9	17	10.3	8.7
Johnsonville, Tenn	95	21	20.1	27	6.7	1	10.8	13.4
Ohio River.								
Pittsburg, Pa	966	22	9.8	14	3.2	5	5.8	6.6
Davis Island Dam, Pa	960	25	10.7	14, 16	4.1	28, 31	6.3	6.6
Beaver Dam, Pa	925	27	15.1	15	5.3	28	8.4	9.8
Wheeling, W. Va	875	36	15.0	17	4.9	28	8.0	10.1
Parkersburg, W. Va	785	36	19.9	16	6.5	7, 29, 30	10.3	13.4
Point Pleasant, W. Va	703	39	35.9	14	5.3	28	13.9	30.6
Huntington, W. Va	660	50	42.2	14	9.1	29	18.8	33.1
Catlettsburg, Ky	651	50	43.7	14	7.8	29	18.8	35.9
Portsmouth, Ohio	612	50	45.9	14	9.9	30	20.9	36.0
Maysville, Ky	559	50	44.5	15	10.1	30	21.3	34.4
Cincinnati, Ohio	499	50	48.2	16	12.9	29	25.2	35.3
Madison, Ind	413	46	40.2	16	11.7	30	22.3	28.5
Louisville, Ky	367	28	21.7	17	5.6	30	10.2	16.1
Evansville, Ind	184	35	35.6	19, 20	11.7	31	21.8	23.9
Mount Vernon, Ind	148	35	34.5	20	11.9	31	21.6	22.6
Paducah, Ky	47	40	31.3	24	14.8	1	22.4	16.5
Cairo, Ill	1	45	38.5	24, 25	24.1	14, 15	30.9	14.4
St. Francis River.								
Marked Tree, Ark	104	17	15.3	31	12.2	5	13.6	3.1
Neosho River.								
Neosho Rapids, Kans	326	22	6.8	11	0.3	7	1.6	6.5
Iola, Kans	262	10	2.8	9, 11	0.6	20–25	1.3	2.2
Oswego, Kans	184	20	8.2	29	0.8	3–5, 10, 24	2.2	7.4
Fort Gibson, Ind. T	3	22	24.0	29	10.5	4, 5	13.9	13.5
Canadian River.								
Calvin, Ind. T	99	10	14.8	27	3.0	19	5.0	11.8
Black River.								
Blackrock, Ark	67	12	22.8	8	10.5	31	15.8	12.3
White River.								
Calicorock, Ark	272	15	25.0	23	2.2	5	10.7	22.8
Batesville, Ark	217	18	26.2	24	5.1	4	13.3	21.1
Newport, Ark	185	26	28.2	26	12.9	4	21.6	15.3
Clarendon, Ark	75	30	29.4	31	25.2	1	27.6	4.2
Arkansas River.								
Pueblo, Colo	1,334	10	4.7	24, 25	3.2	16, 17	3.9	1.5
Wichita, Kans	832	10	6.2	30	3.2	16, 20	4.3	3.0
Tulsa, Ind. T. (1)	551	16	6.6	31	3.0	1, 2	4.4	3.6
Webbers Falls, Ind. T	465	23	19.4	29	5.0	3, 4	9.7	14.4
Fort Smith, Ark	403	22	22.4	30	5.6	5	12.1	16.8
Dardanelle, Ark	256	21	21.2	30, 31	6.0	5, 6	12.3	15.2
Little Rock, Ark	176	23	23.0	31	8.3	5	14.7	14.7
Yazoo River.								
Greenwood, Miss	175	38	26.5	25	21.3	3, 4	24.9	5.2
Yazoo City, Miss	80	25	20.6	30, 31	17.2	6	19.0	3.4
Ouachita River.								
Camden, Ark	304	39	42.8	9	24.3	6	34.4	18.5
Monroe, La	122	40	44.0	31	38.5	1	40.4	5.5
Red River.								
Arthur City, Tex	688	27	25.0	31	8.2	12, 13	14.3	16.8
Kiomache, Tex	614	27	22.4	31	4.5	12	12.3	17.9
Fulton, Ark	515	28	31.4	31	20.1	6	26.7	11.3
Spring Bank, Ark	441	29	32.6	31	29.0	1	30.8	3.6
Shreveport, La	327	29	31.6	31	19.3	1	24.3	12.3
Alexandria, La	118	33	33.5	31	28.8	1	31.0	4.7
Mississippi River.								
St. Cloud, Minn	2,034	4	5.0	14–17	0.5	2	3.1	4.5
St. Paul, Minn	1,954	14	11.7	18, 19	3.7	2, 3	8.4	8.0
Red Wing, Minn	1,914	14	9.8	21	2.9	1, 2	6.7	6.9
Reeds Landing, Minn	1,884	12	8.9	20, 21	2.6	1	6.1	6.3
La Crosse, Wis	1,819	12	10.6	22	3.9	3	7.3	6.7
Prairie du Chien, Wis	1,759	18	12.6	26	4.3	5–7	7.9	8.3
Dubuque, Iowa	1,699	18	13.2	28–30	4.8	6–8	8.4	8.4
Clinton, Iowa	1,629	16	12.2	31	4.4	9, 10	7.6	7.8
Leclaire, Iowa	1,609	10	8.1	31	2.8	8–10	5.1	5.3
Davenport, Iowa	1,593	15	11.0	31	4.2	9, 10	7.2	6.8
Muscatine, Iowa	1,562	16	12.2	31	5.2	10	8.5	7.0
Galland, Iowa	1,472	8	6.1	31	2.5	10, 11	4.4	3.6
Keokuk, Iowa	1,463	15	10.9	31	4.3	10	8.0	6.6

TABLE VI.—*Heights of rivers referred to zeros of gages*.—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Warsaw, Ill.	1,458	18	13.7	31	7.3	10	11.0	6.4
Hannibal, Mo	1,402	13	12.0	31	5.3	11, 12	9.1	6.7
Grafton, Ill	1,306	23	14.4	31	8.7	13	11.9	5.7
St. Louis, Mo	1,264	30	20.7	20	10.9	10	16.1	9.8
Chester, Ill	1,189	30	18.2	21	10.6	11	14.5	7.6
Cape Girardeau, Mo	1,128	28	23.2	22	16.1	12	19.7	7.1
New Madrid, Mo	1,003	34	30.7	24, 25	19.2	15	24.7	11.5
Luxora, Ark	905	33	25.1	27	12.3	1	18.2	12.8
Memphis, Tenn	843	33	28.8	27, 28	15.0	1	21.8	13.8
Helena, Ark	767	42	37.8	29	20.3	1	29.4	17.5
Arkansas City, Ark	635	42	42.8	31	27.5	1	35.0	15.3
Greenville, Miss	595	42	36.3	31	22.4	1	29.0	13.9
Vicksburg, Miss	474	45	39.4	31	26.4	3	32.1	13.0
Natchez, Miss	373	46	39.5	31	29.5	5, 6	33.8	10.0
Baton Rouge, La	240	35	29.2	31	23.3	5, 6	25.9	5.9
Donaldsonville, La	188	28	23.0	31	18.1	7	20.2	4.9
New Orleans, La	108	16	14.7	31	11.8	8	13.0	2.9
Atchafalaya River.								
Simmesport, La	127	......	34.8	31	29.0	6, 7	31.5	5.8
Melville, La	103	31	33.3	31	29.9	5, 6	31.4	3.4
Morgan City, La	19	8	4.8	4	3.1	15, 28	3.9	1.7
Mohawk River.								
Tribeshill, N. Y.	42	12	3.2	4, 6	− 0.2	29–31	1.3	3.4
Schenectady, N. Y.	19	15	2.8	1	1.3	21–31	1.7	1.5
Hudson River.								
Glens Falls, N. Y.	197	8	5.9	2	4.4	25, 26, 30	5.0	1.5
Troy, N. Y.	154	14	5.3	26	3.4	27, 29, 30	4.4	1.9
Albany, N. Y.	147	12	5.4	5, 9	1.3	27	3.8	4.1
Pompton River.								
Pompton Plains, N. J.	6	8	4.6	1, 2	3.8	20–31	4.1	0.8
Lehigh River.								
Mauchchunk, Pa	45	15	4.6	1, 7, 14–18	4.2	26, 29	4.5	0.4
Schuylkill River.								
Reading, Pa	66	12	0.6	16, 19	0.1	9	0.4	0.5
Delaware River.								
Hancock (E. Branch), N. Y.	269	12	3.6	1, 2	3.0	31	3.3	0.6
Hancock (W. Branch), N. Y.	269	10	3.6	7, 15, 16, 18, 19	3.0	30, 31	3.4	0.6
Port Jervis, N. Y	204	14	1.2	1, 2	0.3	31	0.7	0.9
Phillipsburg, N. J.	142	26	2.6	1	1.3	30, 31	1.8	1.3
Trenton, N. J.	92	18	2.2	1, 2, 9, 10	1.2	28–31	1.6	1.0
North Branch Susquehanna.								
Binghamton, N. Y	183	16	3.0	1, 8, 17	2.3	30, 31	2.7	0.7
Towanda, Pa.	139	16	2.3	1	1.3	31	1.8	1.0
Wilkesbarre, Pa	60	17	5.5	1	3.7	29	4.6	1.8
West Branch Susquehanna.								
Clearfield, Pa.	165	8	3.0	15	1.0	30, 31	1.6	2.0
Lockhaven, Pa.	65	12	− 2.6	1–31	− 2.0	1–31	−2.0	0.0
Williamsport, Pa.	39	20	4.2	17	1.8	30, 31	2.8	2.4
Juniata River.								
Huntingdon, Pa.	90	24	4.5	15	3.3	30	3.7	1.2
Susquehanna River.								
Selinsgrove, Pa.	116	17	2.5	1	1.5	30, 31	2.0	1.0
Harrisburg, Pa.	69	17	3.2	18	2.0	30, 31	2.6	1.2
Shenandoah River.								
Riverton, Va.	58	22	0.5	1–14, 19–31	0.1	15–18	0.4	0.4
Potomac River.								
Cumberland, Md.	290	8	3.8	15	2.6	28	3.0	1.2
Harpers Ferry, W. Va.	172	18	4.0	17	−0.8	9, 10	1.1	4.8
James River.								
Buchanan, Va.	305	12	9.9	13	2.3	5–7	4.0	7.6
Lynchburg, Va.	260	18	8.4	13	0.6	3–11	2.2	7.8
Columbia, Va.	167	18	14.0	14	1.6	1	5.4	12.4
Richmond, Va.	111	12	4.3	14	0.0	7	1.2	4.3
Dan River.								
Danville, Va.	55	8	3.5	27	0.0	23–26	0.9	3.5
Roanoke River.								
Clarksville, Va	196	12	5.0	28	0.2	3	2.2	4.8
Weldon, N. C.	129	30	24.8	29	9.6	4	14.1	15.2
Tar River.								
Tarboro, N. C.	46	25	9.5	15	3.2	27, 28	5.9	6.3
Haw River.								
Moncure, N. C.	171	25	14.3	28	1.6	3	6.6	12.7
Cape Fear River.								
Fayetteville, N. C	112	38	27.0	9, 29	6.0	22	15.0	21.0
Waccamaw River.								
Conway, S. C.	40	7	5.4	9–13	3.6	31	4.5	1.8
Pedee River.								
Cheraw, S. C	149	27	21.5	8	2.9	3	8.8	18.6
Smiths Mills, S. C.	51	16	13.8	16–19	9.5	1–3	11.8	4.3
Lynch Creek.								
Effingham, S. C.	35	12	9.0	3, 31	6.8	15, 16	7.8	2.2
Black River.								
Kingstree, S. C. (²)	45	12	10.9	9	6.4	1	9.1	4.5
Catawba River.								
Mount Holly, N. C	28	15	3.3	14	1.8	3	2.5	1.5
Wateree River.								
Camden, S. C.	37	24	15.3	17	5.3	3	9.6	10.0
Congaree River.								
Columbia, S. C	52	15	4.5	5	1.1	2, 3	2.1	3.4
Santee River.								
St. Stephens, S. C.	50	12	8.4	14, 15	5.0	5	7.5	3.4
Edisto River.								
Edisto, S. C.	75	6	5.0	10	2.1	24, 25	3.6	2.9
Broad River.								
Carlton, Ga.	30	11	6.9	8	2.1	2	3.2	4.8
Savannah River.								
Calhoun Falls, S. C.	347	15	7.4	8	2.3	2	3.4	5.1
Augusta, Ga.	268	32	18.5	8	7.3	21	10.1	11.2
Oconee River.								
Milledgeville, Ga.	147	25	7.3	25	1.9	21	3.6	5.4
Dublin, Ga	79	30	5.8	27	0.2	22	2.2	5.6
Ocmulgee River.								
Macon, Ga.	203	18	4.9	25	1.6	22	3.0	3.3
Abbeville, Ga.	96	11	6.5	28, 29	2.8	17	4.7	3.7
Flint River.								
Woodbury, Ga.	227	10	1.4	5	0.2	20, 30, 31	0.6	1.2
Montezuma, Ga.	152	20	6.6	18	3.2	15, 16	4.7	3.4
Albany, Ga.	90	20	6.7	6	2.5	16	4.5	4.2
Bainbridge, Ga	29	22	10.0	7, 8	6.2	17, 18, 24, 25	7.8	3.8
Chattahoochee River.								
West Point, Ga	239	20	5.0	26	2.4	16	3.2	2.6
Eufaula, Ala	90	40	7.0	27	3.0	1, 9	4.5	4.0
Alaga, Ala	30	25	8.3	26	4.3	23	6.0	4.0
Coosa River.								
Rome, Ga.	271	30	13.0	24	1.8	15	4.5	11.2
Gadsden, Ala.	144	22	13.9	26	1.9	15	5.7	12.0
Lock No. 4, Ala.	116	17	12.0	26	2.5	15	5.3	9.5
Wetumpka, Ala	6	45	18.8	28	5.9	15	10.3	12.9
Tallapoosa River.								
Milstead, Ala.	38	35	4.7	26	2.0	15	3.0	2.7
Alabama River.								
Montgomery, Ala.	265	35	14.5	28	3.3	14, 15	6.9	11.2
Selma, Ala	212	35	17.3	30	5.0	15	9.3	12.3
Black Warrior River.								
Tuscaloosa, Ala.	90	43	20.2	28	9.2	21	12.7	11.0
Tombigbee River.								
Columbus, Miss	303	33	10.1	2	3.0	15, 20, 21, 30, 31	5.5	7.1
Demopolis, Ala.	155	35	22.2	12	7.5	22	15.4	14.7
Leaf River.								
Hattiesburg, Miss	60	20	14.0	1	4.0	14, 22	6.6	10.0
Chickasawhay River.								
Enterprise, Miss	144	18	11.2	27	2.3	20	4.7	8.9
Shubuta, Miss	106	25	17.1	1	3.0	22, 23	8.2	14.1
Pascagoula River.								
Merrill, Miss.	78	20	19.3	2, 3	6.2	15	11.2	13.1
Pearl River.								
Jackson, Miss	242	20	18.6	1	6.5	31	11.6	12.1
Columbia, Miss.	110	14	18.1	1	8.9	22, 31	11.6	9.2
Sabine River.								
Logansport, La.	315	25	33.8	26	24.2	7, 10	28.7	9.6
Neches River.								
Rockland, Tex	105	20	25.0	18	16.5	1	20.7	8.5
Beaumont, Tex	18	10	6.9	27	4.0	1	5.5	2.9
Trinity River.								
Dallas, Tex.	320	25	35.1	23	7.3	7	21.4	27.8
Long Lake, Tex.	211	35	42.7	20	37.1	1	40.9	5.6
Riverside, Tex.	112	40	42.3	19	28.1	8	36.4	14.2
Liberty, Tex	20	25	26.9	25–31	24.8	1	26.3	2.1
Brazos River.								
Kopperl, Tex.	345	21	22.0	14	1.8	5	7.5	20.2
Waco, Tex.	285	24	30.4	1	7.2	31	13.1	23.2
Valley Junction, Tex.	215	40	40.6	2	10.8	31	21.4	29.8
Hempstead, Tex	140	40	40.5	5	21.0	31	34.6	19.5
Booth, Tex	61	39	37.5	20	21.4	31	32.1	16.1
Colorado River.								
Ballinger, Tex.	489	21	6.5	13	1.8	1, 5–9, 18–22	2.7	4.7
Austin, Tex.	214	18	10.2	9	2.5	24	4.9	7.7
Columbus, Tex.	98	24	32.2	3	11.2	27	17.6	21.0
Guadalupe River.								
Gonzales, Tex	112	22	23.0	2	2.1	31	5.7	20.9
Victoria, Tex	35	16	21.9	1	5.1	31	11.5	16.8
Rio Grande River.								
El Paso, Tex. (³)	1,030	14	14.1	30, 31	11.6	13	12.5	2.5
Red River of the North.								
Moorhead, Minn.	284	26	18.4	17	7.8	1, 2	11.6	10.6
Kootenai River.								
Bonners Ferry, Idaho.	123	24	13.5	22, 31	5.2	6	10.0	8.3
Pend d'Oreille River.								
Newport, Wash.	86	14	4.8	31	1.5	1	2.9	3.3
Snake River.								
Lewiston, Idaho	144	24	8.2	31	5.3	1–3, 7, 15	6.0	2.9
Columbia River.								
Wenatchee, Wash	473	40	20.5	31	11.0	1, 2	15.2	9.5
Umatilla, Oreg.	270	25	11.4	31	7.2	3–5	8.8	4.2
The Dalles, Oreg.	166	40	16.0	31	10.3	6	12.7	5.7
Willamette River.								
Eugene, Oreg.	183	10	5.8	11	3.2	1	4.5	2.6
Albany, Oreg.	118	20	4.6	13	2.3	6–8	3.4	2.3
Salem, Oreg	84	20	4.0	24	1.6	7–9	2.7	2.4
Portland, Oreg.	12	15	8.3	31	5.0	10	6.9	3.3
Sacramento River.								
Red Bluff, Cal.	201	23	6.3	8	3.0	29–31	3.9	3.3
Sacramento, Cal.	64	25	19.6	1, 2	17.5	31	18.6	2.1

(¹) 30 days only. (²) 29 days only. (³) 21 days only.

Chart X. Total Snowfall for May, 1905.

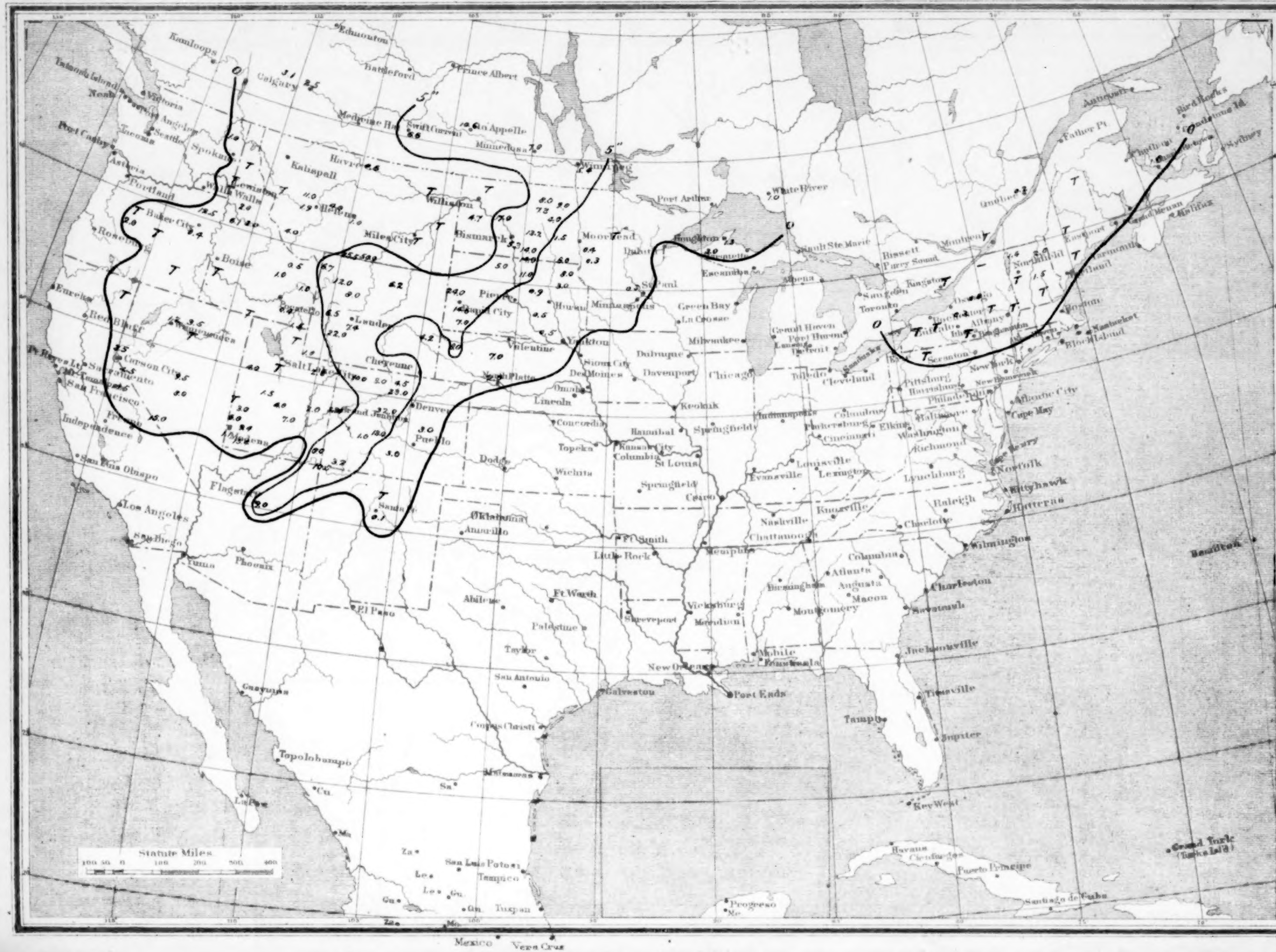


Chart IX. Sea-Level Isobars, Surface Temperatures, and Resultant Winds, May, 1905.

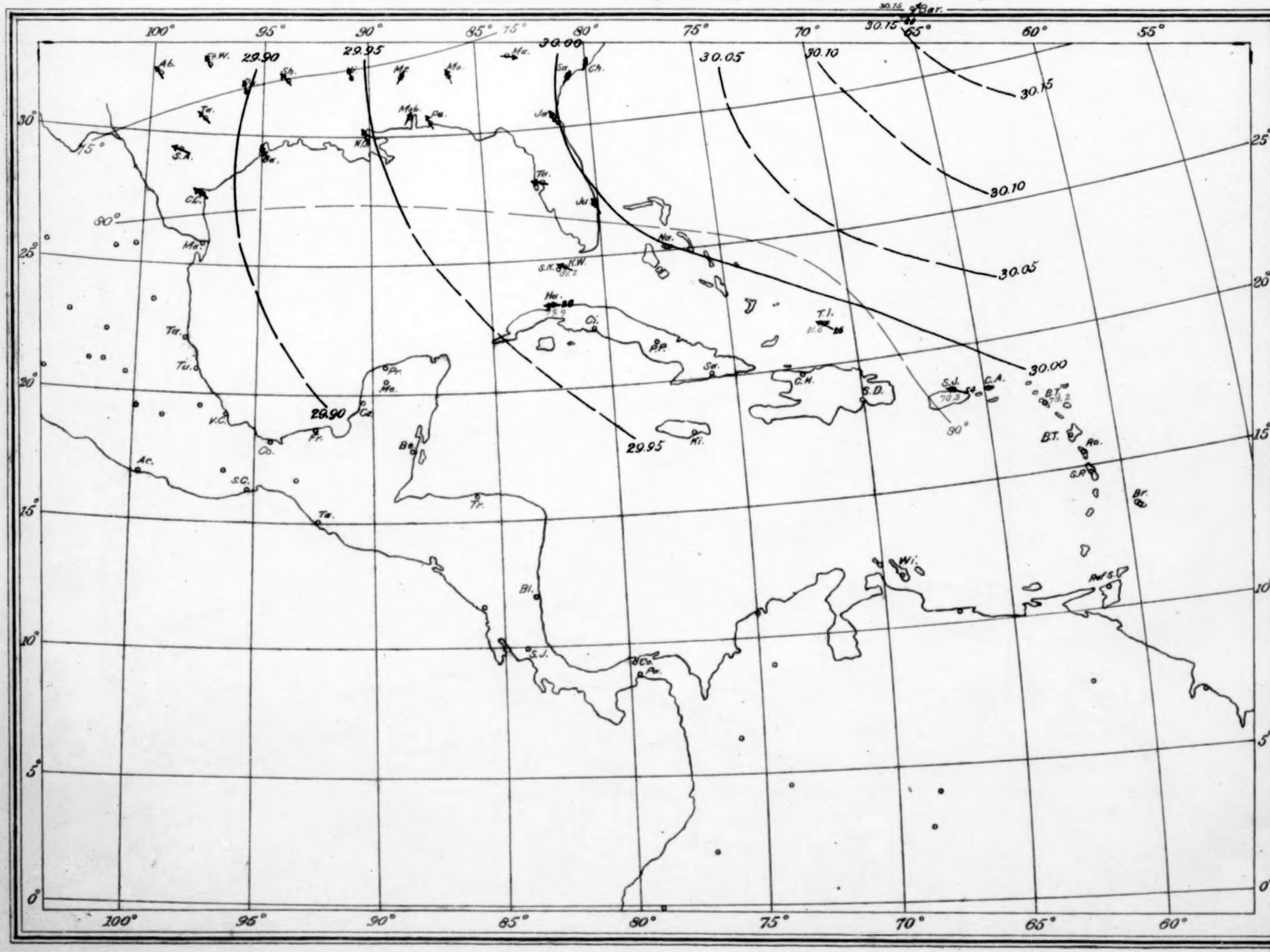


Chart VIII. Isobars and Isotherms at Sea Level; Resultant Surface Winds, May, 1905.

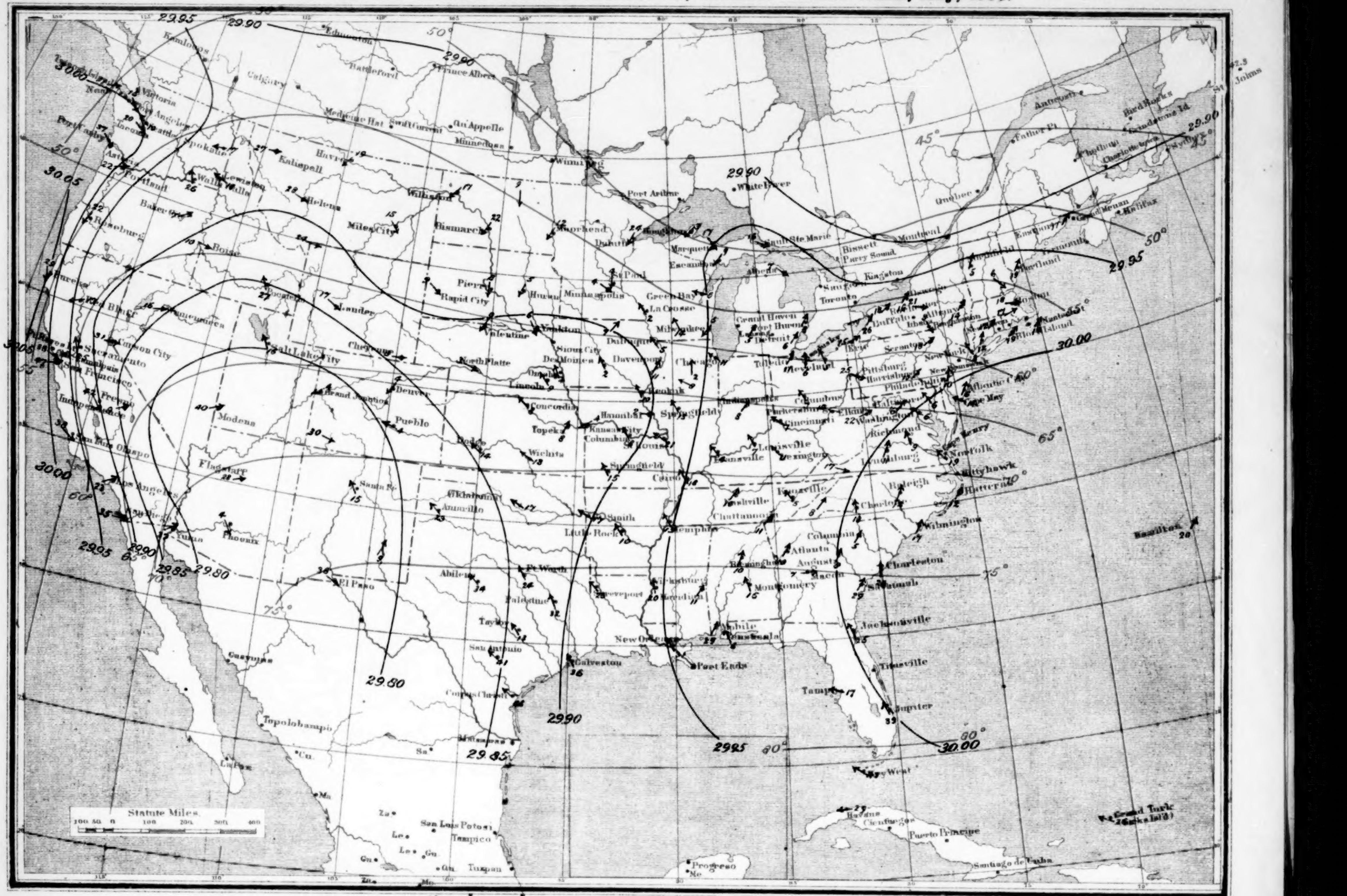


Chart IX. Sea-Level Isobars, Surface Temperatures, and Resultant Winds, May, 1905.

Chart VII. Isobars and Isotherms at 3500 feet, May, 1905.

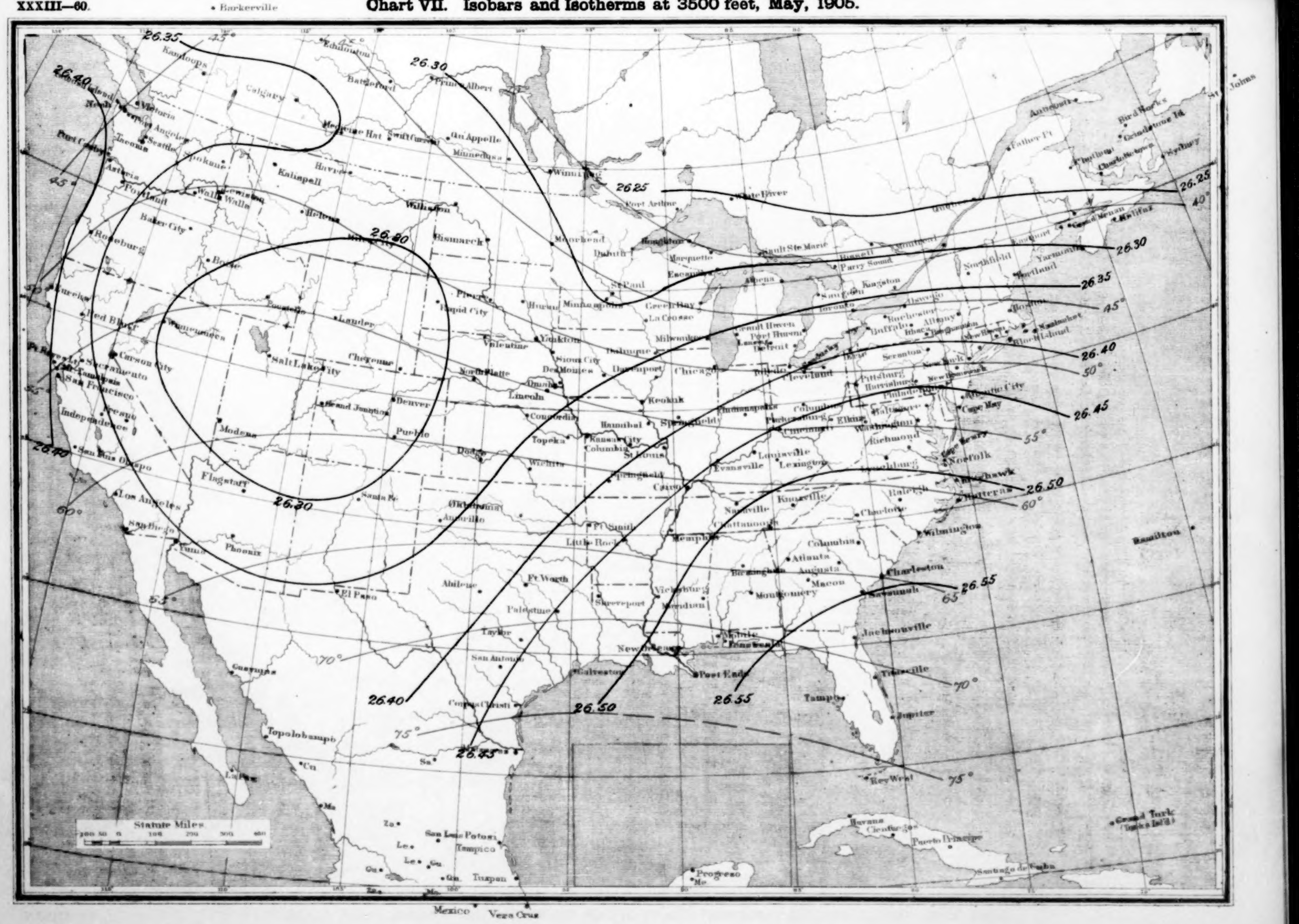


Chart VI. Isobars and Isotherms at 10,000 feet, May, 1905.

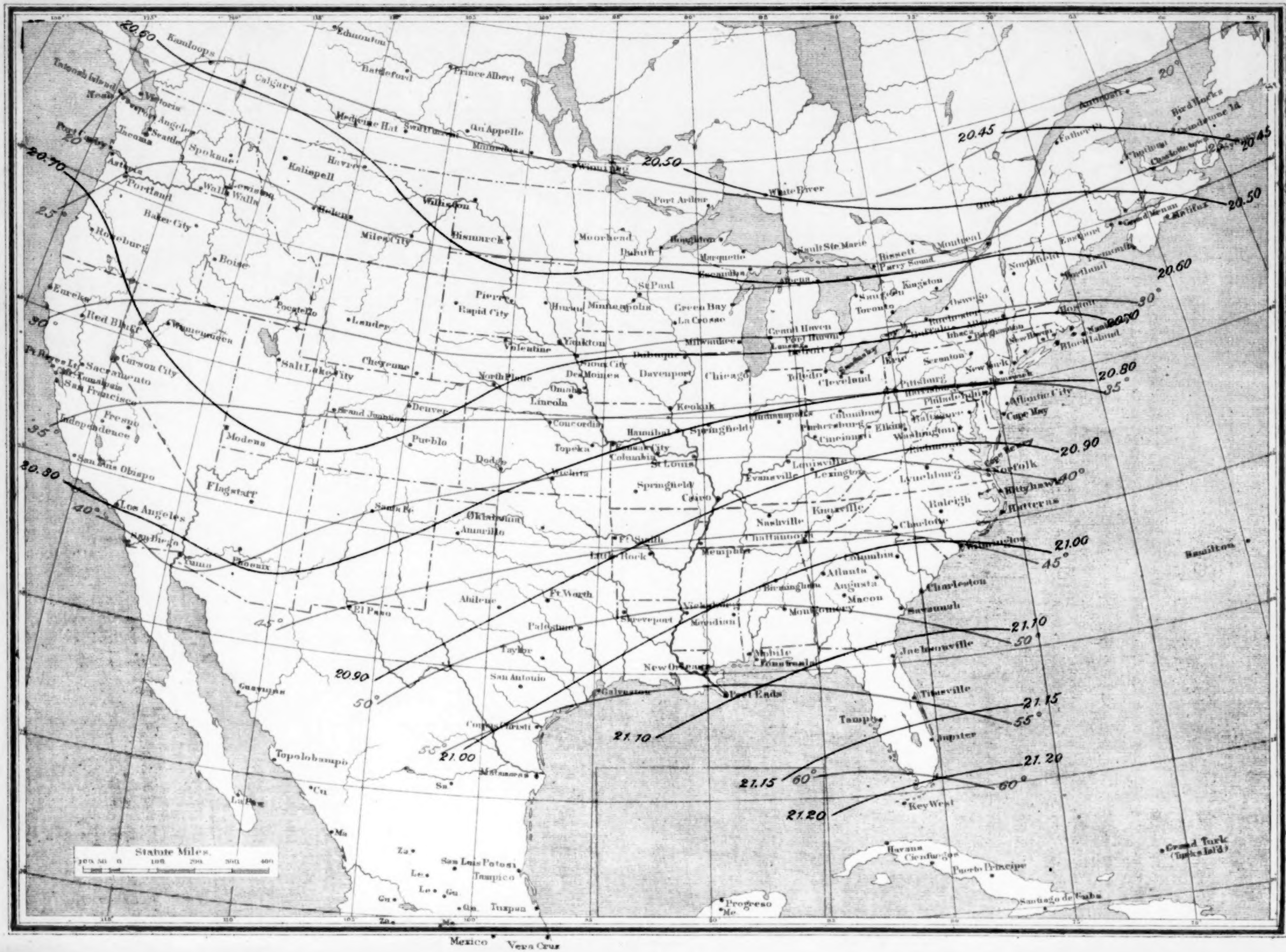


Chart V. Hydrographs for Seven Principal Rivers of the United States, May, 1905.

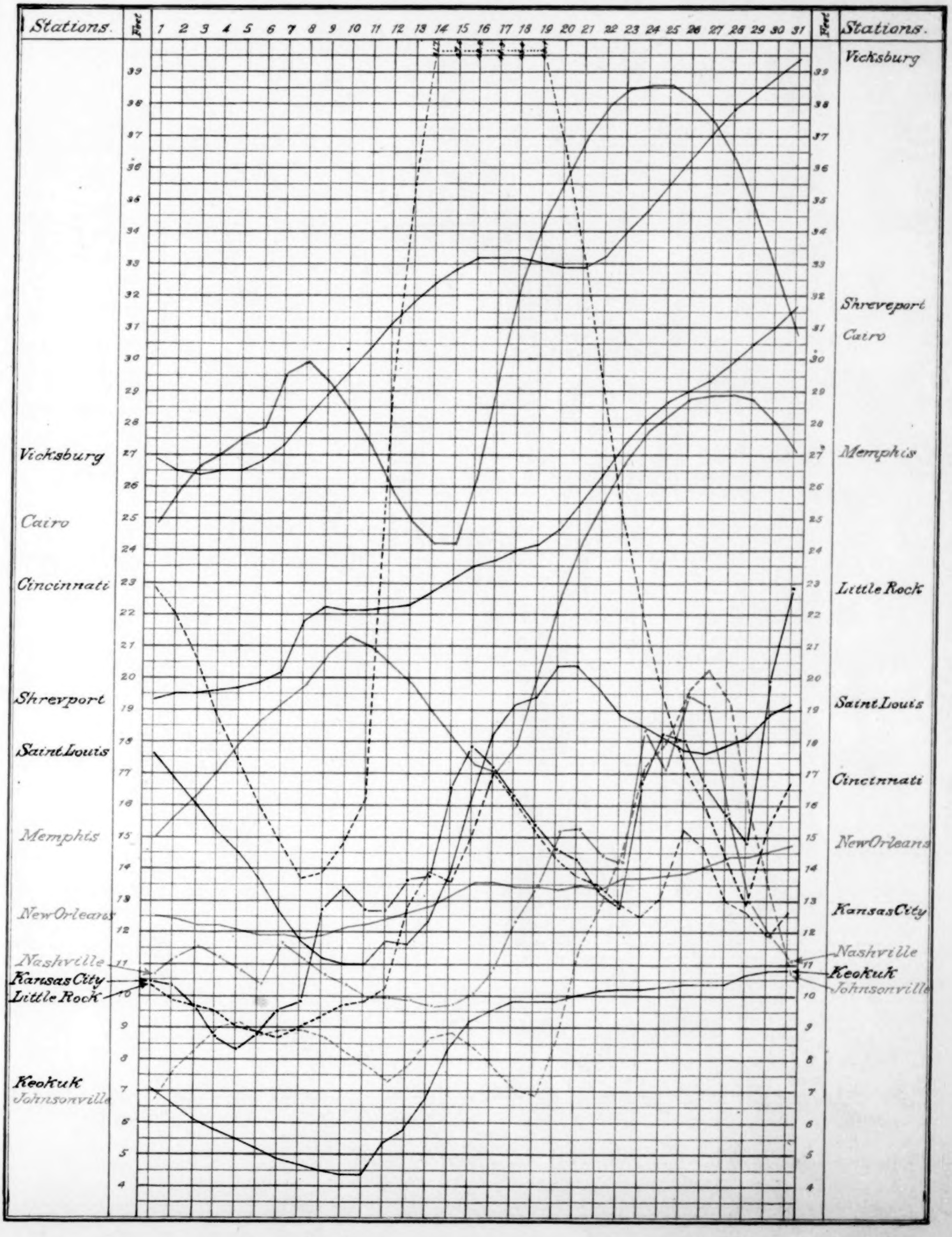


Chart IV. Percentage of Clear Sky, May, 1905.

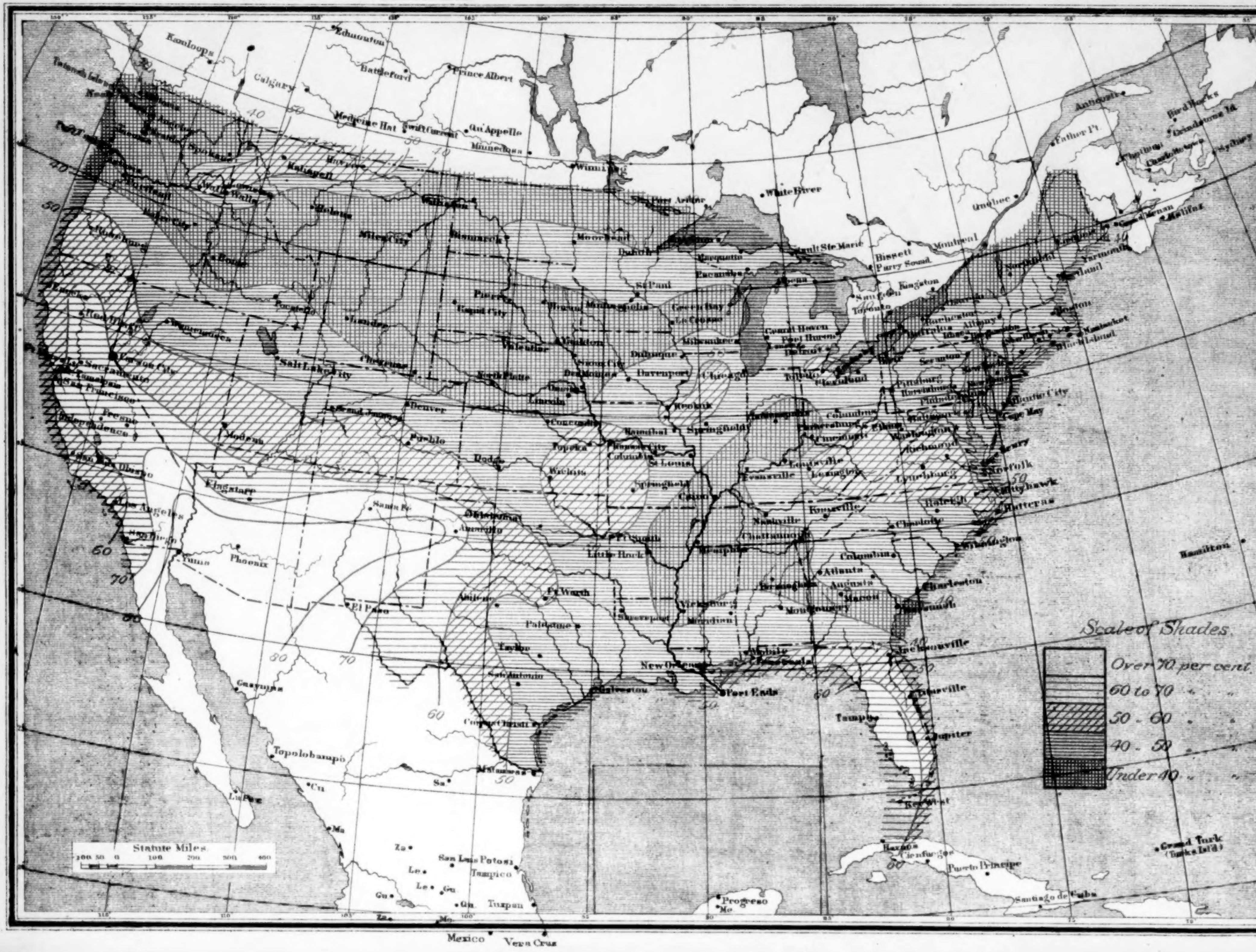


Chart III. Total Precipitation, May, 1905.

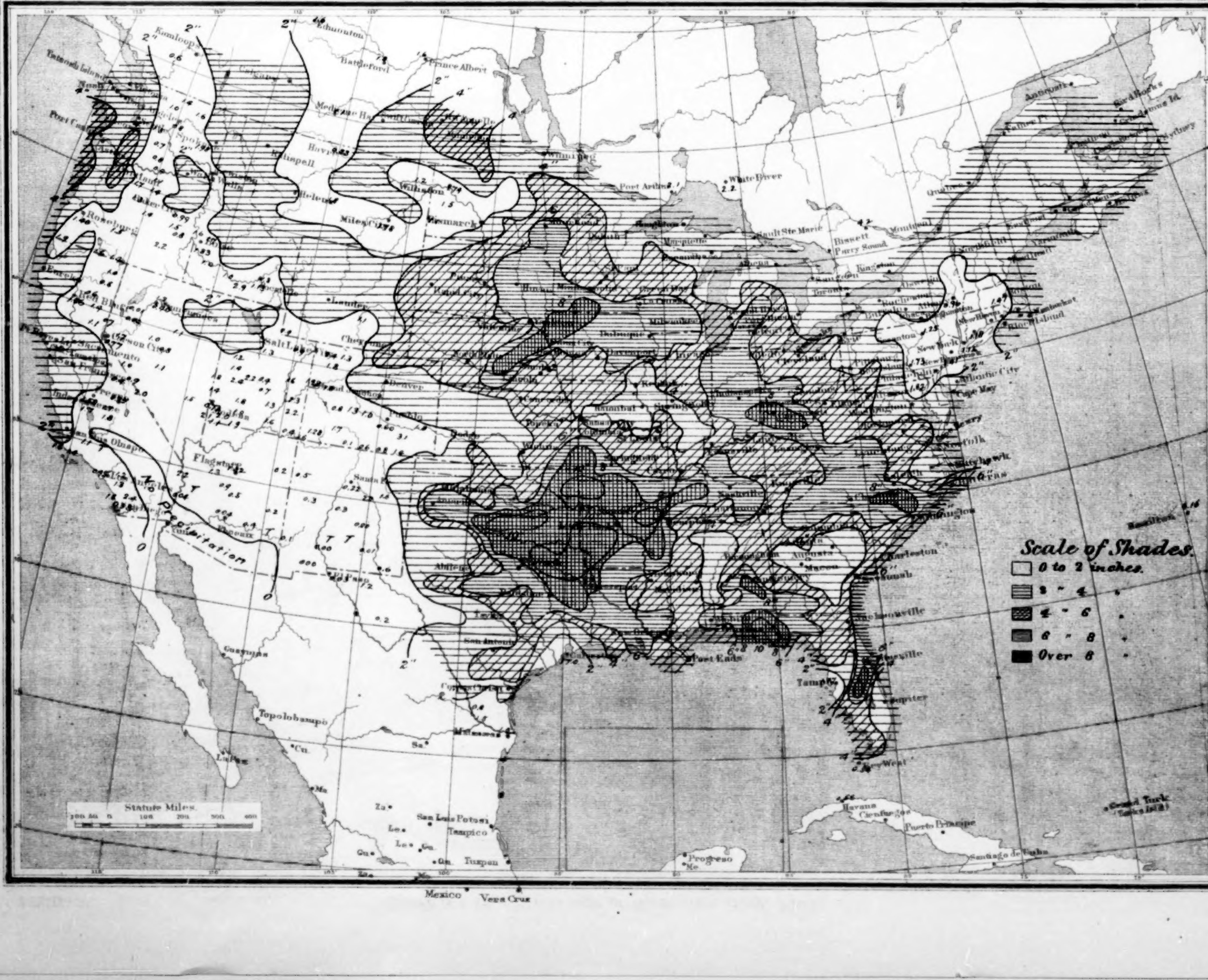


Chart II. Tracks of Centers of Low Areas, May, 1905.

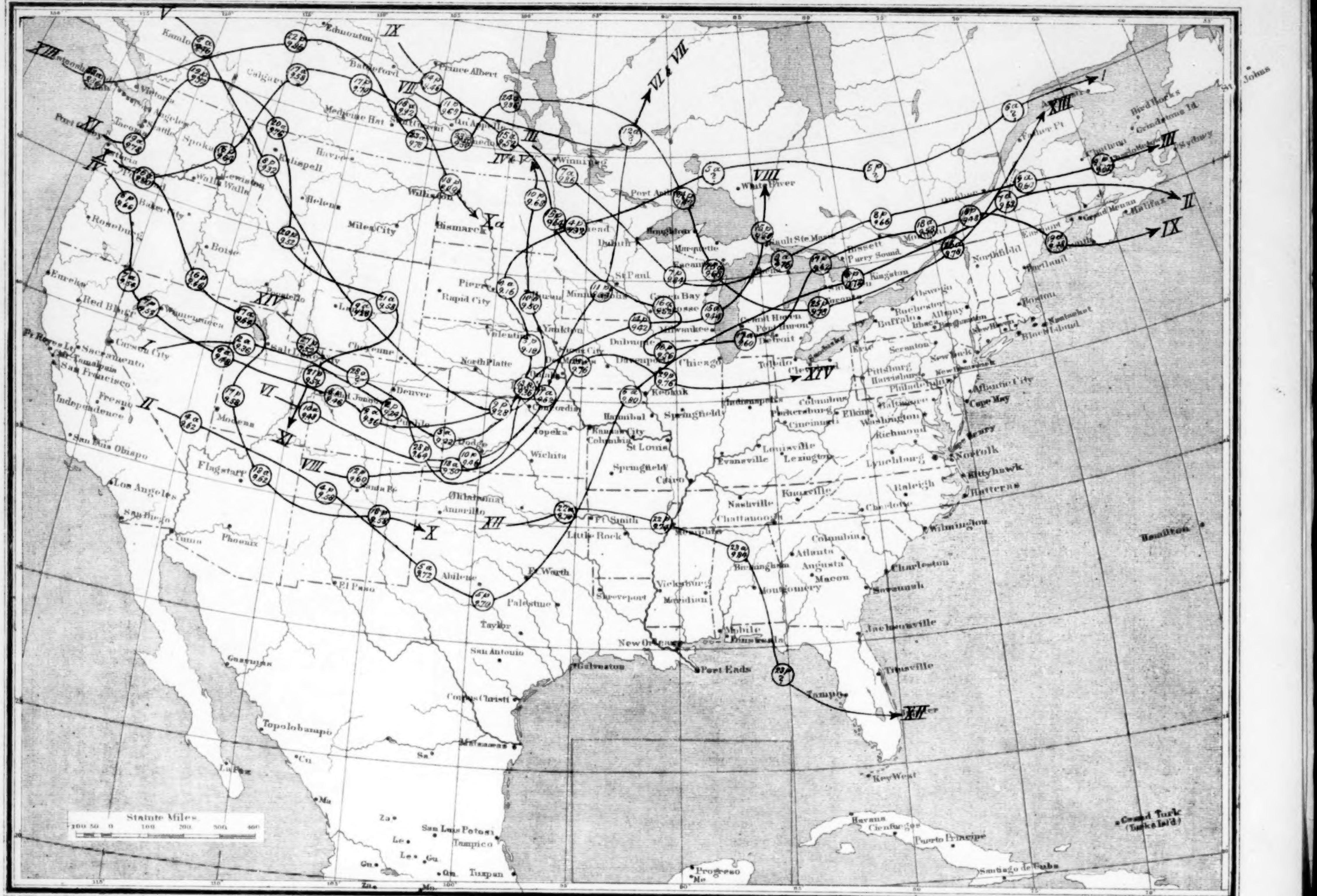
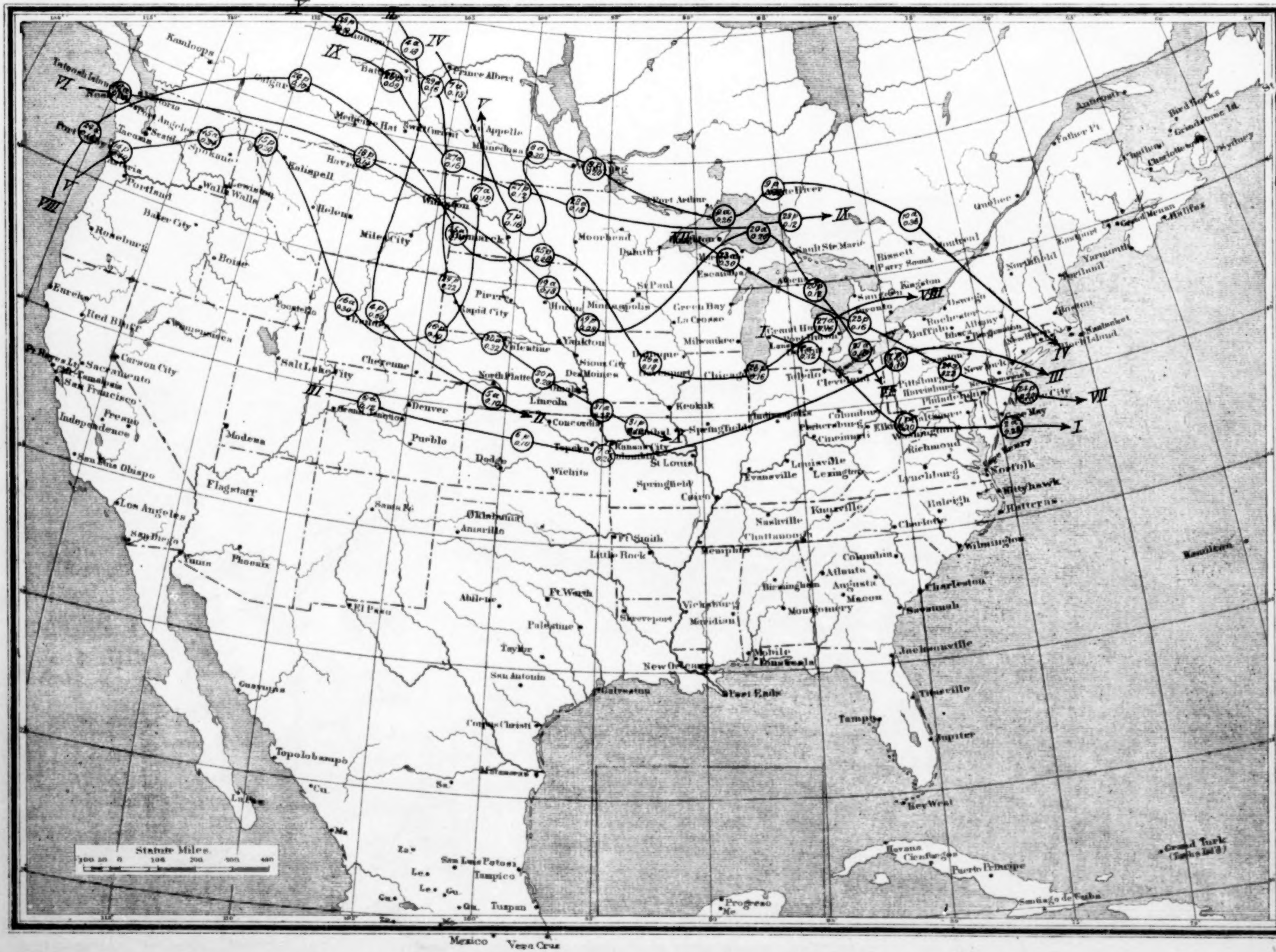


Chart III. Total Precipitation, May, 1905.

Chart I. Tracks of Centers of High Areas, May, 1905.



Honolulu, Hawaii, latitude, 21° 19′ north, longitude 157° 52′ west; barometer above sea, 38 feet; gravity correction, —.057 applied. May, 1905.

Day.	Pressure.*		Air temperature.				Moisture. 8 a. m.		Moisture. 8 p. m.		Wind. 8 a. m.		Wind. 8 p. m.		Precipitation.		Clouds. 8 a. m.			Clouds. 8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.11	30.08	71.2	72.2	78	63	65.0	71	64.3	65	ne.	16	ne.	7	0.26	T.	6	S.-cu.	e.	2	S.-cu.	e.
2	30.08	30.07	74.2	72.0	78	68	66.7	67	67.0	77	ne.	8	ne.	9	0.01	0.01	4	S.-cu.	e.	8	N.	e.
3	30.10	30.05	75.4	72.0	79	68	67.2	65	66.0	73	ne.	11	ne.	9	0.07	T.	2	Cu.	ne.	1 4	S.-cu. N.	e. e.
4	30.10	30.09	73.4	71.0	78	68	65.9	67	67.1	82	ne.	9	ne.	9	T.	0.01	5	S.-cu.	e.	9	N.	e.
5	30.12	30.12	73.4	70.2	76	68	65.5	65	66.0	80	ne.	7	ne.	8	T.	0.03	8	N.	e.	9	N.	0
6	30.15	30.12	74.0	72.0	78	66	65.2	62	65.0	69	e.	13	ne.	6	0.01	0.00	5	S.-cu.	e.	5	S.-cu.	e.
7	30.14	30.13	74.0	72.5	77	68	65.5	63	65.0	67	ne.	10	ne.	15	T.	0.00	1 1	Cu. S.-cu.	e. e.	5	N.	ne.
8	30.12	30.07	74.0	72.6	80	68	68.3	65	65.1	67	ne.	9	ne.	4	0.06	0.00	6	S.-cu.	e.	few.	S.-cu.	e.
9	30.06	30.06	74.1	72.5	80	69	65.6	63	66.1	71	ne.	7	e.	3	T.	T.	2 5	A.-cu. S.-cu.	e. e.	few.	S.-cu.	e.
10	30.09	30.10	75.4	73.3	80	67	68.4	70	67.3	73	ne.	6	ne.	6	0.05	0.01	2 2	Cu. N.	e. e.	7	N.	e.
11	30.14	30.12	76.2	73.2	79	69	67.2	62	65.7	67	ne.	11	ne.	20	0.01	0.01	2	S.-cu.	e.	3 2	S.-cu. N.	e. e.
12	30.14	30.13	74.3	73.0	79	70	64.8	60	65.5	67	ne.	8	ne.	11	0.01	0.00	1 6	Cu. S.-cu.	e. e.	6	S.-cu.	e.
13	30.13	30.10	74.2	73.2	78	68	65.4	62	65.3	65	ne.	10	ne.	9	0.06	0.00	2	Cu.	e.	4	Cu.	e.
14	30.12	30.09	75.0	73.4	78	70	66.0	62	65.1	64	ne.	12	ne.	14	T.	T.	2	S.-cu.	e.	2	Cu.	e.
15	30.13	30.10	74.2	73.2	79	70	65.2	61	64.1	61	ne.	15	e.	7	T.	T.	2	S.-cu.	e.	1 1	Cu. S.-cu.	e. e.
16	30.12	30.12	72.5	72.4	79	67	66.1	71	63.4	61	e.	16	e.	11	0.01	T.	6 2	S.-cu. N.	e. e.	4	S.-cu.	ne.
17	30.16	30.13	74.0	72.9	78	69	64.7	60	64.0	61	e.	12	ne.	17	T.	T.	5	Cu.	e.	8	S.-cu.	e.
18	30.12	30.07	73.4	73.0	78	69	64.7	62	63.5	59	ne.	9	ne.	16	T.	0.01	5 1	Cu. S.-cu.	e. e.	4	Cu.	e.
19	30.08	30.05	73.0	73.4	78	68	66.0	69	64.4	61	ne.	9	e.	11	T.	T.	1 5	Cu. S.-cu.	se. e.	2	S.-cu.	e.
20	30.05	30.07	75.6	74.0	79	69	68.2	71	66.8	68	n.	5	e.	9	0.01	0.02	2 2	Cu. S.-cu.	e. e.	5	S.-cu.	e.
21	30.10	30.06	75.4	72.5	78	68	65.5	59	66.5	73	ne.	7	ne.	5	0.02	T.	1	Cu.	e.	4 2	S.-cu. N.	ne. ne.
22	30.04	30.00	74.5	71.4	79	68	65.6	62	67.2	80	ne.	7	ne.	4	0.03	0.04	3 2	Ci. Cu.	w. e.	9	N.	e.
23	29.98	29.97	74.5	73.4	79	66	69.0	76	66.4	69	e.	6	e.	2	0.41	0.00	2 3	Cu. S.-cu.	e. e.	1	S.-cu.	e.
24	29.98	29.97	74.5	72.4	80	68	65.5	62	65.1	68	sw.	5	e.	4	0.00	0.00	2	Cu.	e.	1	S.-cu.	e.
25	29.97	29.95	73.0	75.0	78	66	66.9	73	69.0	74	w.	5	n.	6	0.00	0.00	2 5	A.-cu. S.-cu.	0 ?	7	S.-cu.	s.
26	29.95	29.94	76.0	72.0	78	64	67.0	62	68.0	82	nw.	5	ne	3	0.00	T.	1	Ci.-s.	0	10	N.	?
27	29.97	29.98	75.4	73.5	79	66	68.2	69	68.0	76	w.	3	ne.	7	0.07	0.00	1	Cu.	0	10	S.-cu.	?
28	29.98	29.97	74.1	73.3	79	67	68.6	76	67.0	72	ne.	4	ne.	15	0.06	0.00	3 3	Ci. S.-cu.	w. ne.	9	S.-cu.	ne.
29	29.98	29.98	76.0	72.9	80	70	67.8	65	64.4	63	ne.	11	ne.	6	0.00	0.00	3 3	Ci.-cu. S.-cu.	w. e.	1 3	Ci.-s. S.-cu.	? e.
30	30.02	30.02	75.2	73.4	79	68	66.2	62	65.2	64	n.	4	ne.	8	0.00	T.	few.	S.-cu.	0	9	S.-cu.	ne.
31	30.02	30.02	75.3	73.0	79	68	65.0	57	65.0	65	ne.	9	ne.	6	0.00	T.	5 1	A.-cu. Cu.	ne. e.	5	S.-cu.	ne.
Mean	30.073	30.056	74.3	72.7	78.6	67.8	66.4	65.5	65.8	69.2	ne.	8.7	ne.	8.6	1.15	0.15	4.3	Cu.	e.	5.3	S.-cu.	e.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. * Pressure values are reduced to sea level and standard gravity.

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XXXIII—54. • Bakerville Chart I. Tracks of Centers of High Areas, May, 1905.

COSTA RICAN CLIMATOLOGICAL DATA.

Communicated by Mr. H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San José de Costa Rica, during May, 1905.*

Hours.	Pressure.	Temperature.	Relative humidity.	Rainfall.		Sunshine.	Cloudiness.	Temperature of the soil at depth of—			
				Amount.	Duration.			6 inches.	12 inches.	24 inches.	48 inches.
	Inches.	° F.	%	Ins.	Hrs.	Hrs.	%	° F.	° F.	° F.	° F.
1 a. m	26.13	64.5	93	......	......	......	......	......	......	......	......
2 a. m	26.12	64.3	98	......	......	......	......	......	......	......	......
3 a. m	26.11	63.9	91	......	......	......	......	......	......	......	......
4 a. m	26.10	63.3	92	......	......	......	......	......	......	......	......
5 a. m	26.10	63.0	92	......	......	......	......	......	......	......	......
6 a. m	26.11	63.0	92	......	......	......	......	......	......	......	......
7 a. m	26.12	64.6	85	......	......	14.98	54	73.4	73.7	74.5	73.1
8 a. m	26.13	68.4	75	......	......	21.14	......	......	......	......	......
9 a. m	26.14	72.6	66	......	......	21.77	......	......	......	......	......
10 a. m	26.14	76.0	63	......	......	23.00	66	73.6	73.7	74.6	73.0
11 a. m	26.13	76.1	58	......	......	21.21	......	......	......	......	......
Noon	26.13	79.5	55	0.07	0.50	14.26	......	......	......	......	......
1 p. m	26.11	80.1	58	0.15	0.28	17.93	81	74.6	73.8	74.6	74.2
2 p. m	26.09	78.8	63	0.37	1.08	16.18	......	......	......	......	......
3 p. m	26.08	75.3	71	2.82	3.36	9.31	......	......	......	......	......
4 p. m	26.07	72.1	78	1.39	5.69	4.76	96	75.1	74.4	74.6	73.0
5 p. m	26.08	69.9	83	0.91	7.95	1.77	......	......	......	......	......
6 p. m	26.09	68.4	87	1.21	9.35	......	......	......	......	......	......
7 p. m	26.10	67.4	89	0.64	8.63	......	90	74.8	74.4	74.6	74.3
8 p. m	26.12	66.9	89	0.38	6.54	......	......	......	......	......	......
9 p. m	26.13	66.4	89	0.23	4.21	......	......	......	......	......	......
10 p. m	26.15	66.1	89	0.02	1.17	......	73	74.5	74.3	74.6	73.1
11 p. m	26.15	65.7	90	0.02	0.33	......	......	......	......	......	......
Midnight...	26.14	65.2	91	......	......	......	......	......	......	......	......
Mean ..	26.11	69.3	81	......	......	......	76	74.3	74.1	74.6	73.1
Min	26.03	59.0	34	......	......	......	......	......	......	......	......
Max	26.21	85.5	100	......	......	......	......	......	......	......	......
Total ...	......	......	......	8.21	49.09	166.31	......	......	......	......	......

REMARKS.—At San José the barometer is 3835 feet above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 5 feet above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. The standard rain gage is 5 feet above ground. Since January 1, 1902, observations at San José have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San José local time.

TABLE 2.—*Rainfall at stations in Costa Rica, May, 1905.*

Stations.	Rainfall.		Stations.	Rainfall.	
	Amount.	Number of days.		Amount.	Number of days.
	Inches.			Inches.	
Boca Banano..............	8.31	16	Madre de Dios............	5.51	17
Bearesem	6.69	16	Las Lomas	1.65	26
Limon........................	6.14	12	Las Concavas..............	4.88	25
Coro Farm	5.79	12	Tres Rios....................	7.09	22
Zent	5.35	24	San Jose.....................	8.21	23
Victoria......................	10.91	26	La Verbana................	13.07	4
La Louisiana..............	8.86	15	Nuestro Amo..............	7.99	20
La Columbiana	10.43	19	Olajuela......................	11.10	29
Iroquois	20.79	21	Puntarenas.................	4.09	7
San Carlos..................	6.77	14	Las Canos	5.94	10

Notes on earthquakes.—May 1, 0^h 30^m p. m., shock E.-W., intensity I, duration 4 seconds. May 5, 10^h 15^m p. m., shock NW.-SE., intensity II, duration 4 seconds. May 11, 7^h 40^m p. m., SW.-NE., intensity I, duration 3 seconds. May 20, 9^h 59^m p. m., WNW.-ESE., intensity I, duration 3 seconds.